VOLUME LVII NUMBER TWO

THE NATIONAL GEOGRAPHIC MAGAZINE

FEBRUARY, 1930

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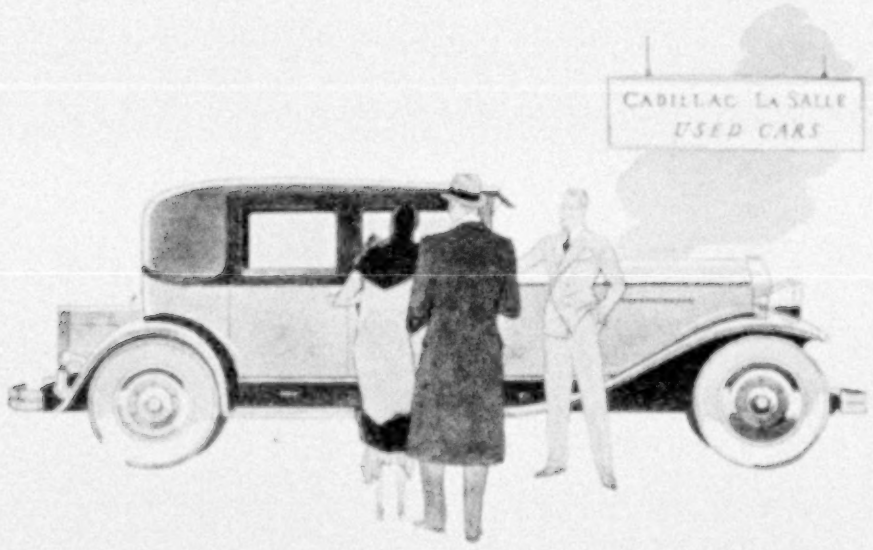

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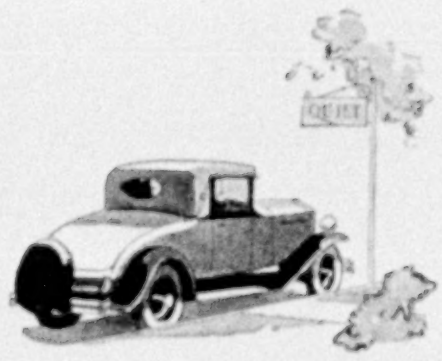

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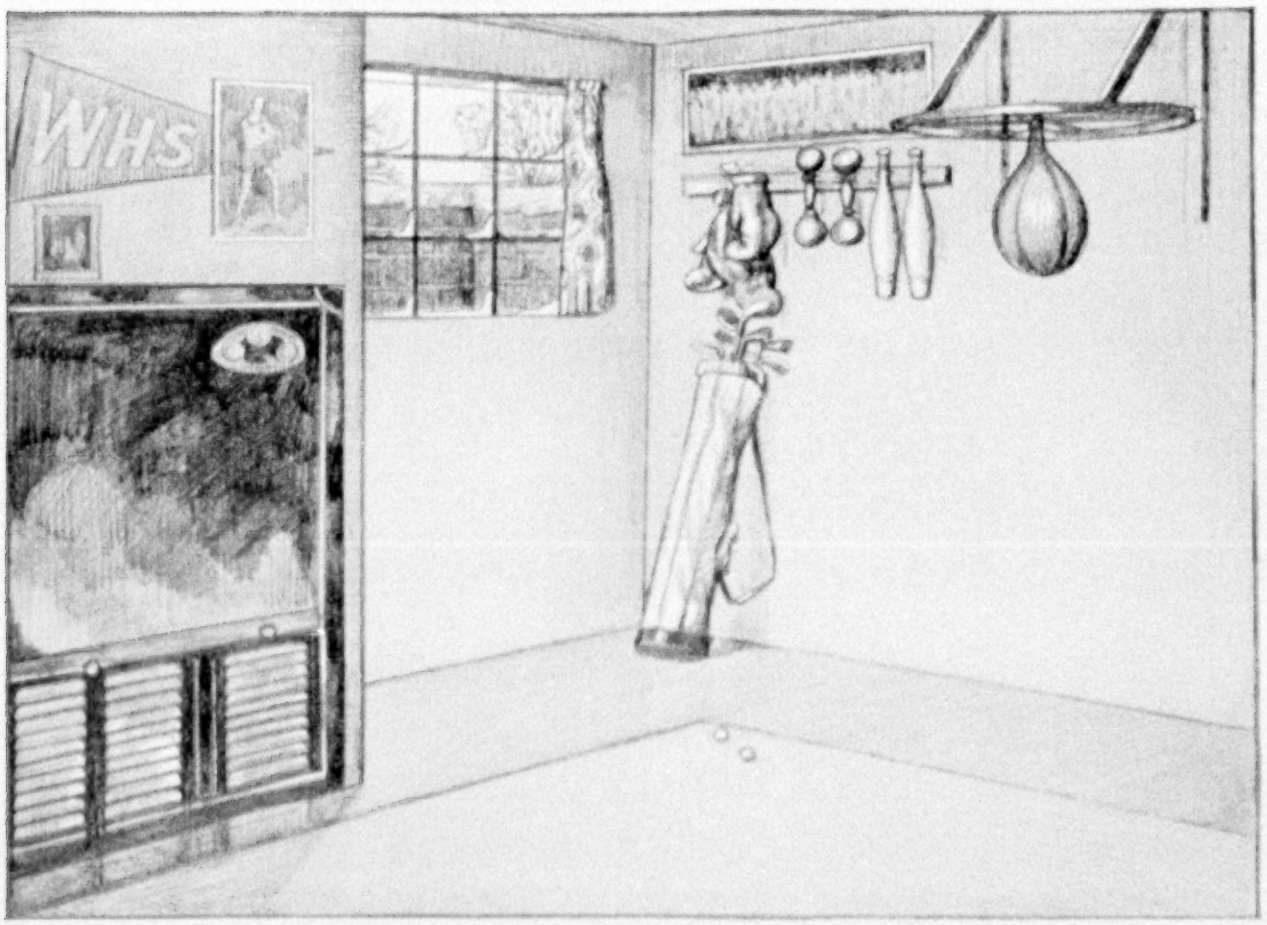

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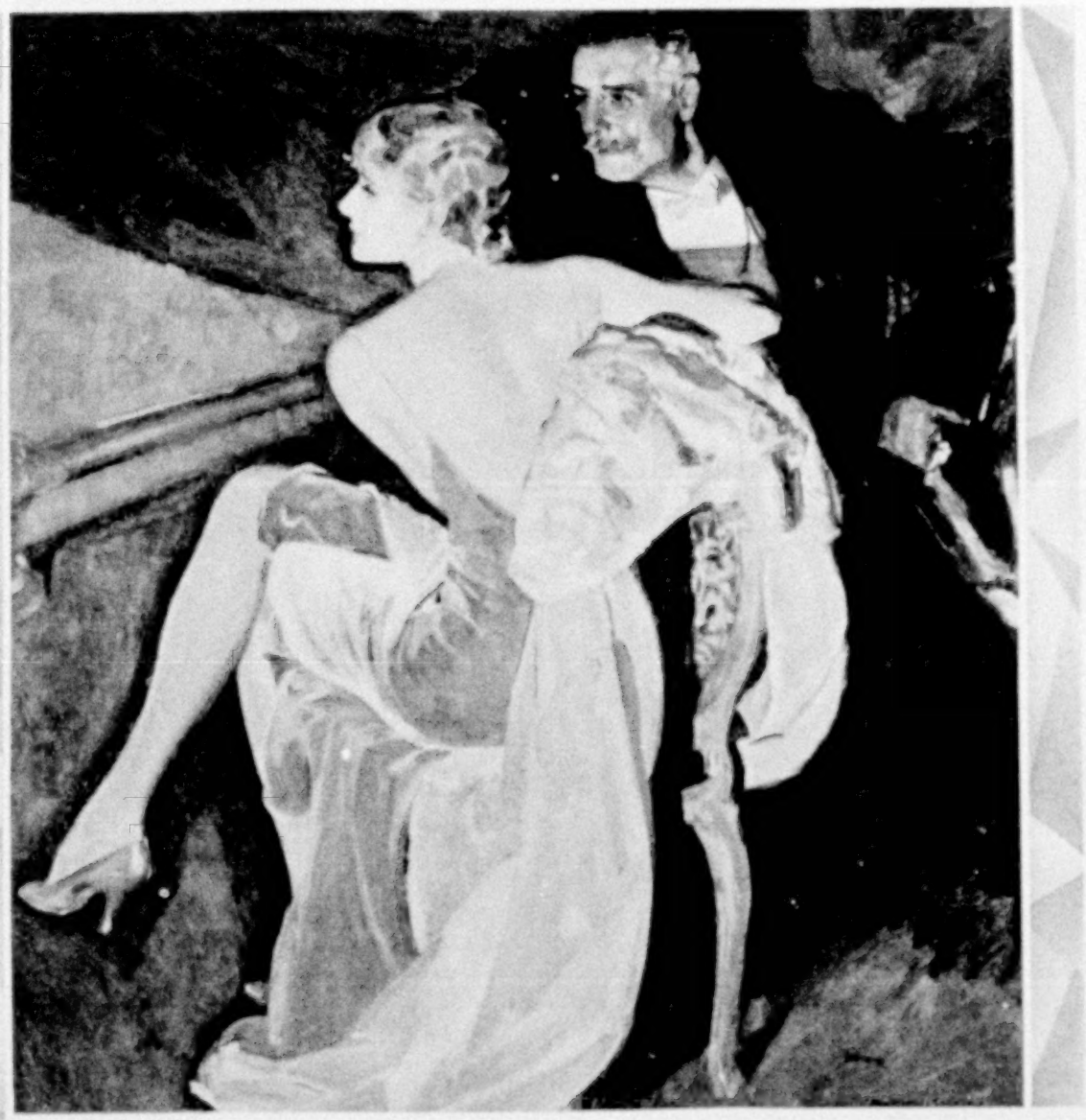

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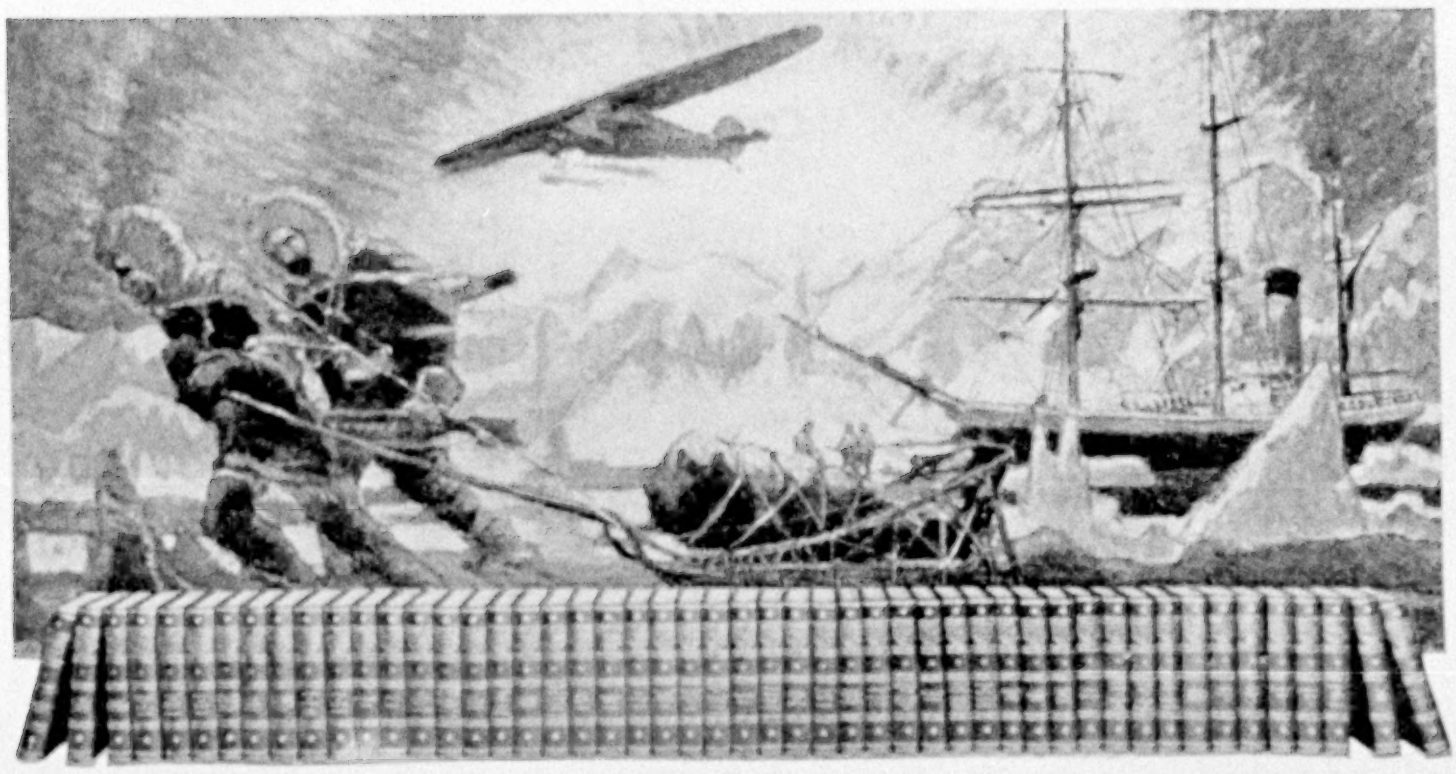

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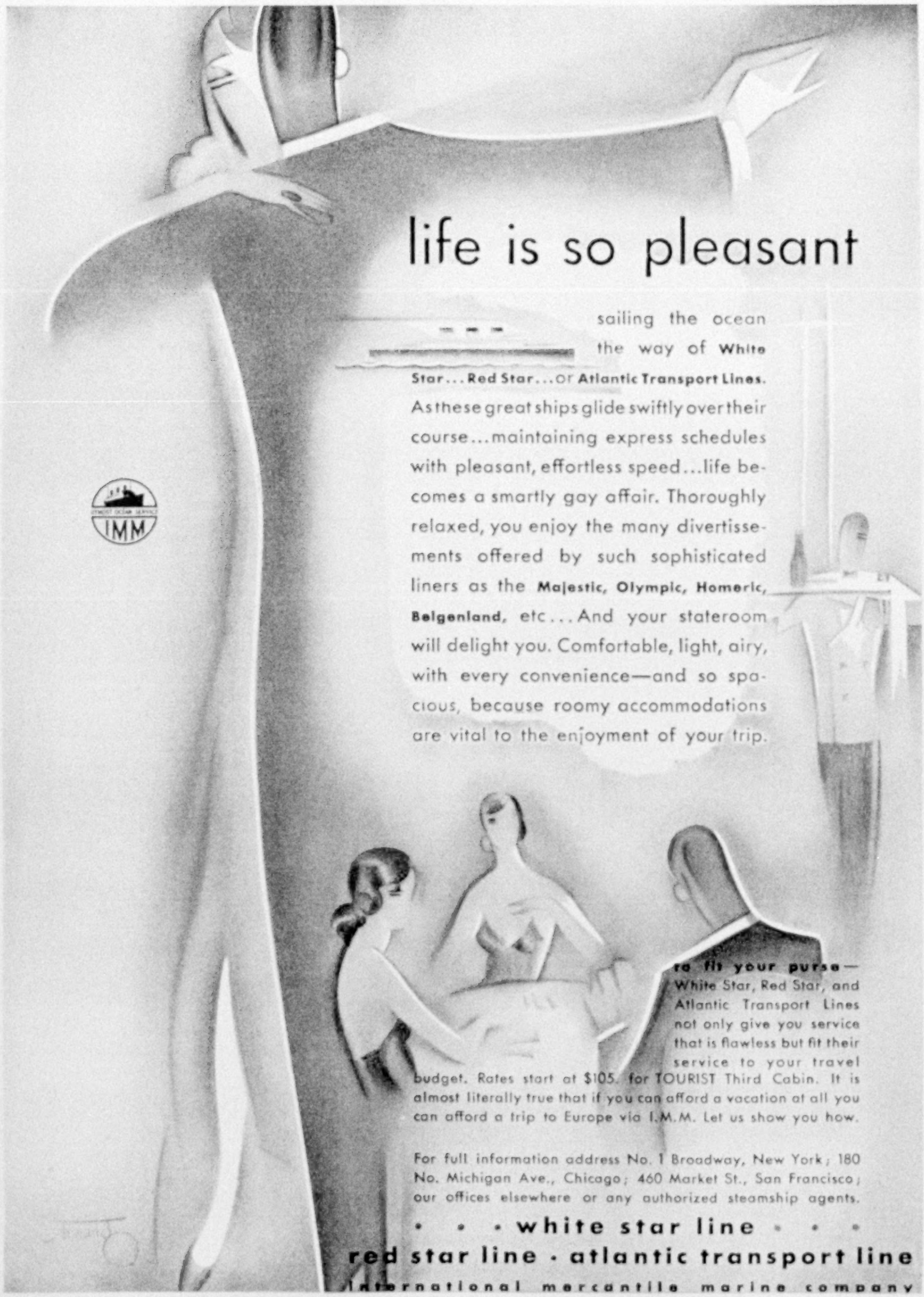

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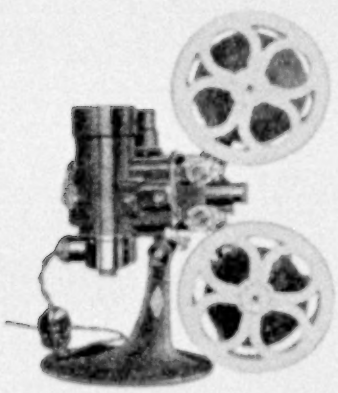

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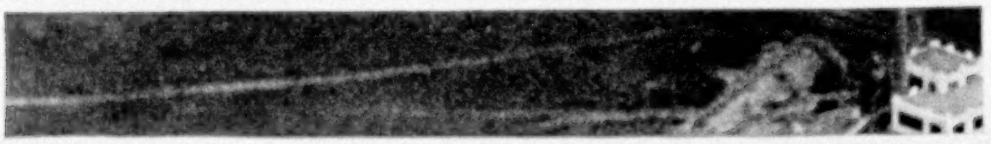

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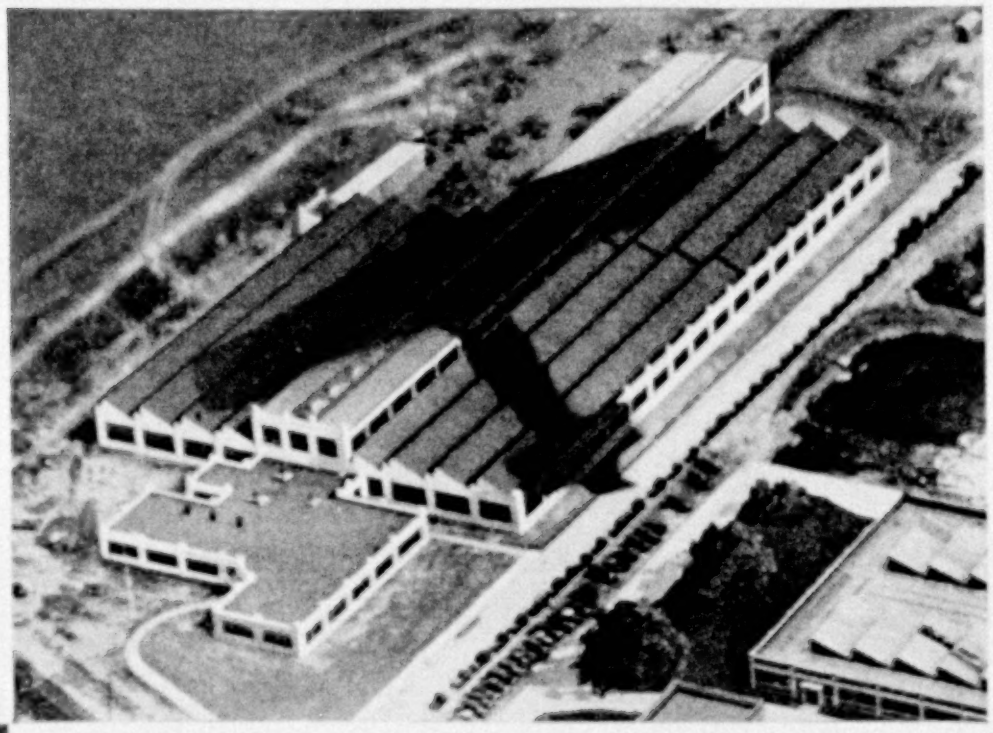

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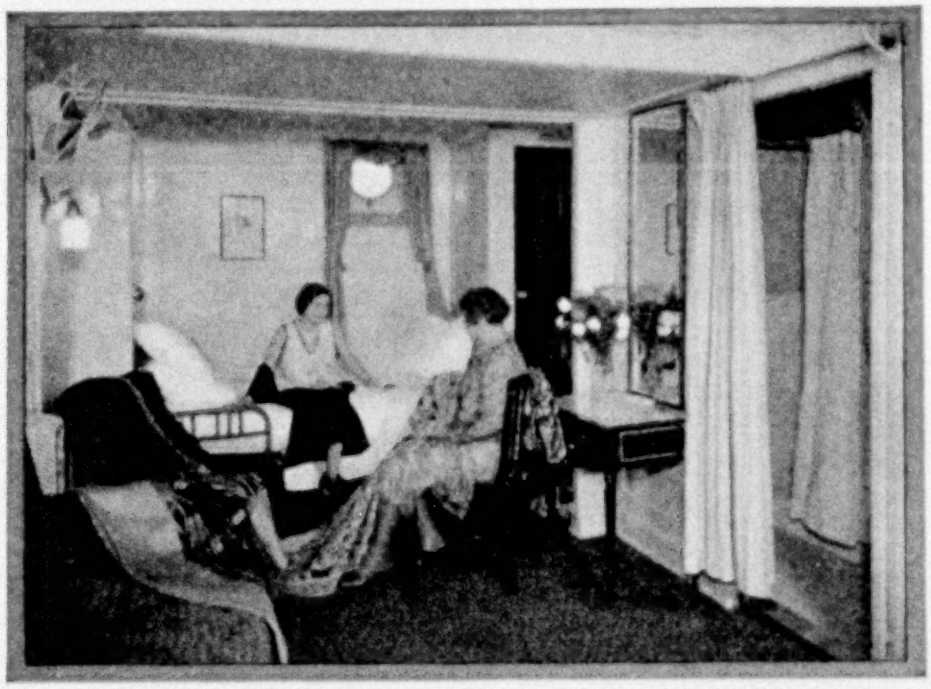

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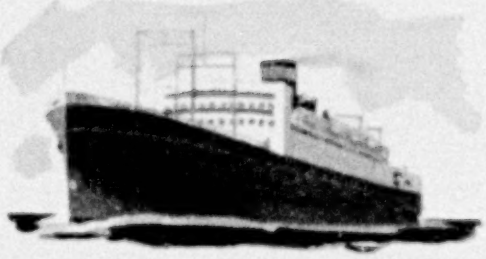

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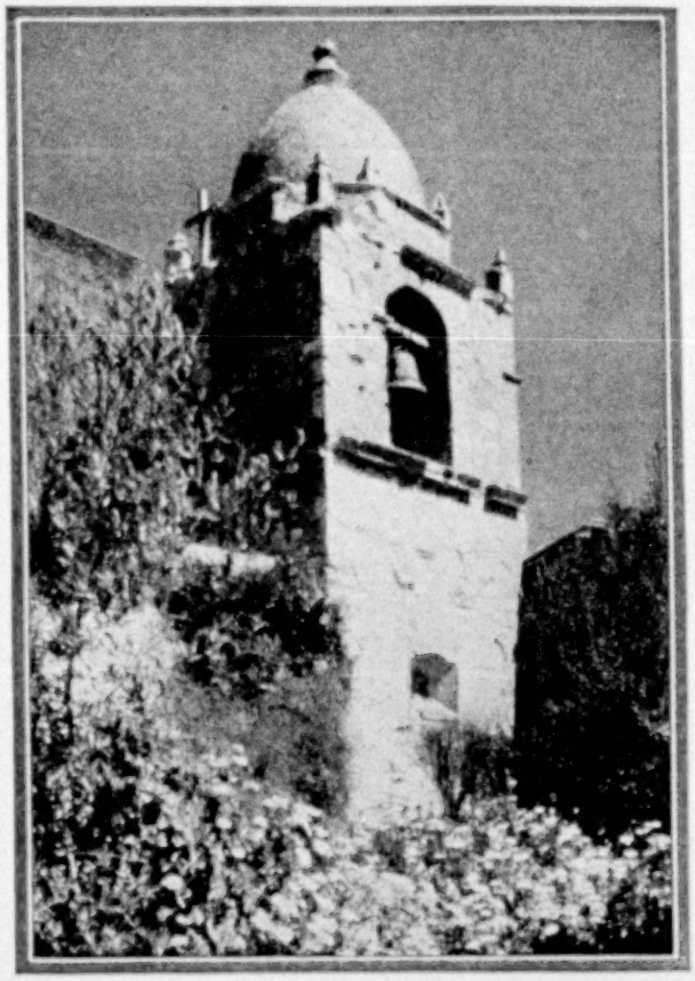

CARMEL MISSION—AT CARMEL-BY-THE-SEA

Where thousands came once to visit and returned again to live as they had only dreamed of playing—there surely, you'll enjoy this summer . . . .

California: where one day's lure is high-hilled San Francisco—the next your choice of half a hundred other fascinating places, down beside the sea or thrust by mountains into philosophic skies!

California calls you to a freedom for the body and the mind . . . calls you from Yosemite and Lake Tahoe, from mountain lakes and streams, and Redwood forests; debonair Del Monte and the like, where golf is played above a yacht-flecked ocean; and from San Francisco, with its secret . . . of buoyant, joyous living.

San Francisco, America's coolest summercity,isright in the center of this great vacationland and part of it . . . a worldly, cultured, cosmopolitan part.

Here is headquarters city for the business of the whole Pacific Coast. And here a future that perhaps you'll want to make your own. *The coupon below will bring an illustrated book that is sure to quicken your imagination.*

Beginning May 15, low roundtrip excursion rates will be in effect to San Francisco and the Pacific Coast on all railroads. The Victory and Lincoln Highways will be in good condition. Or come by air, or by steamship via Panama Canal.

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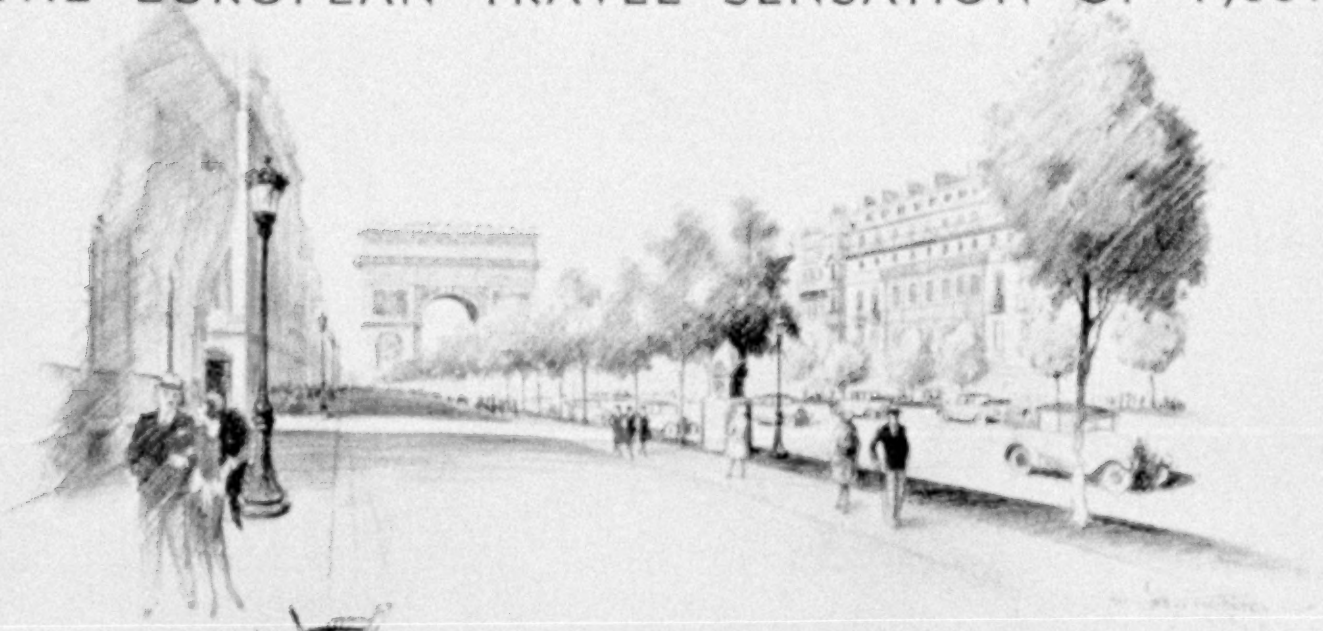

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• • FLYING DOWN TO ECUADOR

Passing El Misti in the Peruvian Andes at 110 miles an hour

A LITTLE MORE than a year ago we wrote as a prophetic statement that American air-lines would soon be reaching down to the mainland of South America! Today big tri-motored, all-metal Ford planes are not only reaching the mainland of South America, from Panama, the West Indies, and Florida, but they are flying on, farther and farther southward, where there are no roads, no trails, and man can only cross geographical barriers by taking wings across the sky. . . .

Pan-American air-liners, using only multiple-engined planes of large passenger capacity, are winging over the islands of the Gulf of Mexico and the countries of the mainland. Well-organized tours, operating in conjunction with railroads and steamships, reach Nassau, Mexico, Cuba, Haiti, Dominican Republic, Republic of Panama. In addition, there are 4000 miles of airways over which the Pan-American carries mail to Honduras, British Honduras, Nicaragua, Costa Rica, Colombia and Curacao.

Over the South American mainland the Pan-Grace lines, cooperating with the Pan-American, are sending Ford planes speeding across the jungles and mountains of Venezuela, Colombia, Ecuador, Peru and Chile on regular schedules!

Ford planes have proven to be most logical vehicles for these great pioneer lines that must operate over enormous distances and hazardous country with the safety and efficiency of railroads.

FORD MOTOR COMPANY

Visitors are always welcome at the Ford Airport at Detroit

The Ford Plane

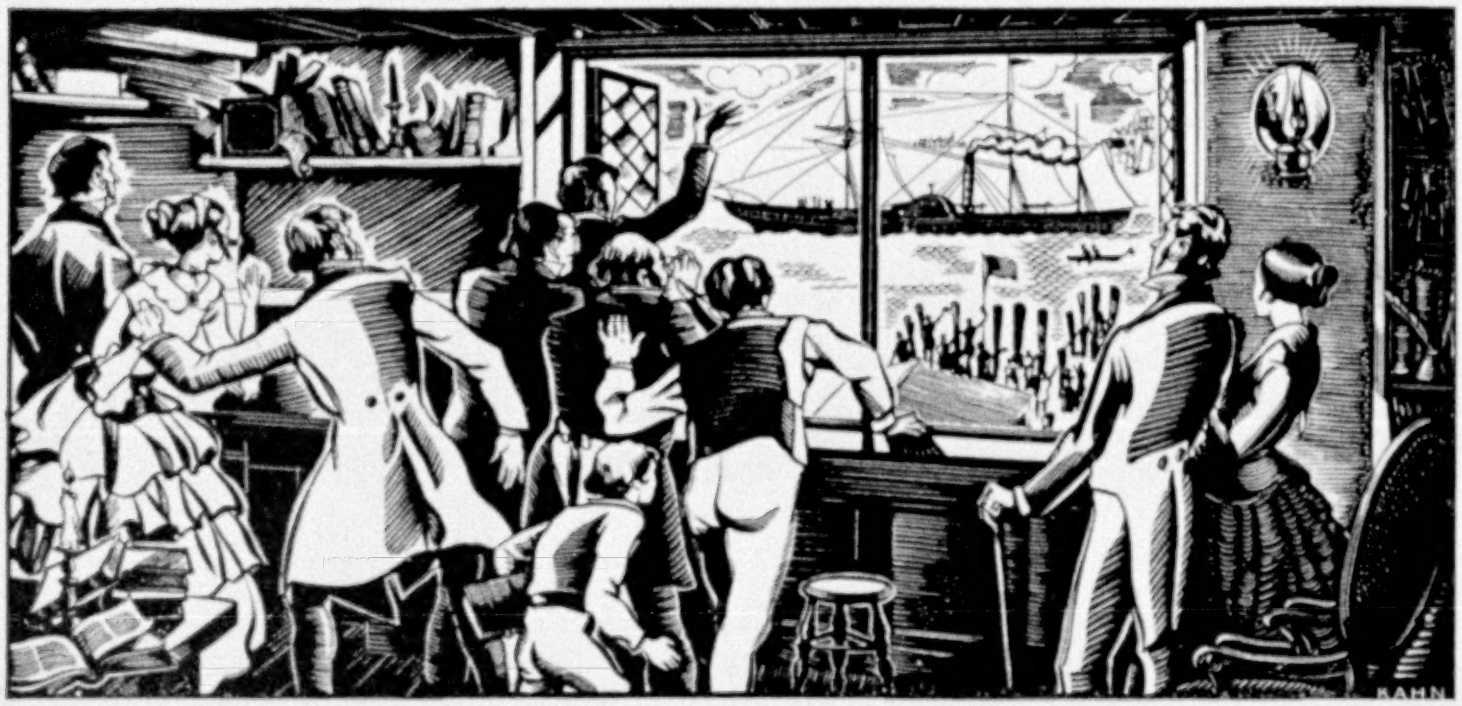
The Ford plane is planned, constructed and operated as a commercial plane. Built of corrugated aluminum alloys, it has great structural strength, unequaled durability, and is most economical to maintain in operation. The uniformity of its material is determined by scientific test. All planes have three motors in order to insure reserve power to meet and overcome all emergencies. The engines may be Wright or Pratt & Whitney, air-cooled, totaling from 900 to 1275 horse-power. Ford planes have a cruising range of from 580 to 650 miles at speeds between 55 and 135 miles per hour. Loads may be carried weighing from 3670 to 6000 pounds.

The human capacity of these planes is 13 to 15 passengers and a crew of two (pilot and assistant). Each plane is equipped with a buffet, toilet, running water, electric lights, adjustable chairs.

The price of the Ford tri-motored, all-metal plane is exceptionally low because of its highly scientific methods of commercial production. Price is $42,000 to $55,000 at Dearborn.

Ford branches will be glad to give you information on the Ford tri-motored, all-metal plane in all models.

THE BRITANNIA-1840



Next to Boston's TEA-PARTY *was the Party Boston gave* CUNARD

Federal St. Meeting House

'T was a momentous day—that July 19th, away back in 1840. How the people rejoiced. How Boston celebrated. Full 20,000 came to see and to cheer—"despite the dank fog of the night." The cannonading was terrific—Gun powder was burned in immense quantities. And the great Banquet the Select-men gave to Samuel Cunard, *Cunard—the Nation's Benefactor; Cunard—The Empire Builder* they hailed him.

And Ezra Gannett preached an entire sermon on the event at Federal Street Meeting House—Not since the coming of the Mayflower—200 years before, had a ship meant so much; for "never before had a vessel of such class, size and stateliness appeared in our Port." And wonder of wonders—a *Steam* ship—a palatial collossus of a *Thousand* tons—and a full *270 feet from stem to stern.*

And so it was that Ezra Gannett, in Federal Street Meeting House called the People for "Prayer and Rejoicing." And these stirring words he spoke on the coming of the Britannia: "It illustrates the power and wisdom of the Creator * * * With the coming of the Britannia our wealth will be augmented, our activities quickened, and means of employment created * * * It means that Boston is destined to become a place of great business, of large population and great wealth * * * The coming of the Britannia will confirm the harmonious relations that exist between our country and Europe * * * No event since the commencement of the present century involves more important consequences to this Nation than Mr. Cunard's *Steam* ship Britannia * * * The establishment of regular steam connection between Boston and Liverpool. Its effect will be seen in the industry, wealth, population, manners and general culture of our inhabitants * * * A LANDMARK IN THE PROGRESS OF OUR COUNTRY."

And now after 90 YEARS

the 1,000 ton Britannia evolutes into the regally sized — royally apparelled BERENGARIA, AQUITANIA, MAURETANIA —Cunard's famous express service. The crossing is cut to 5 days. What a history is this of Cunard accomplishment.

CUNARD

A copy of the sermon of Ezra Gannett, upon "The Coming of the Britannia" in facsimile form, as originally printed in 1840, will be sent on request. Cunard Steam Ship Co., Ltd., 25 Broadway, N. Y.

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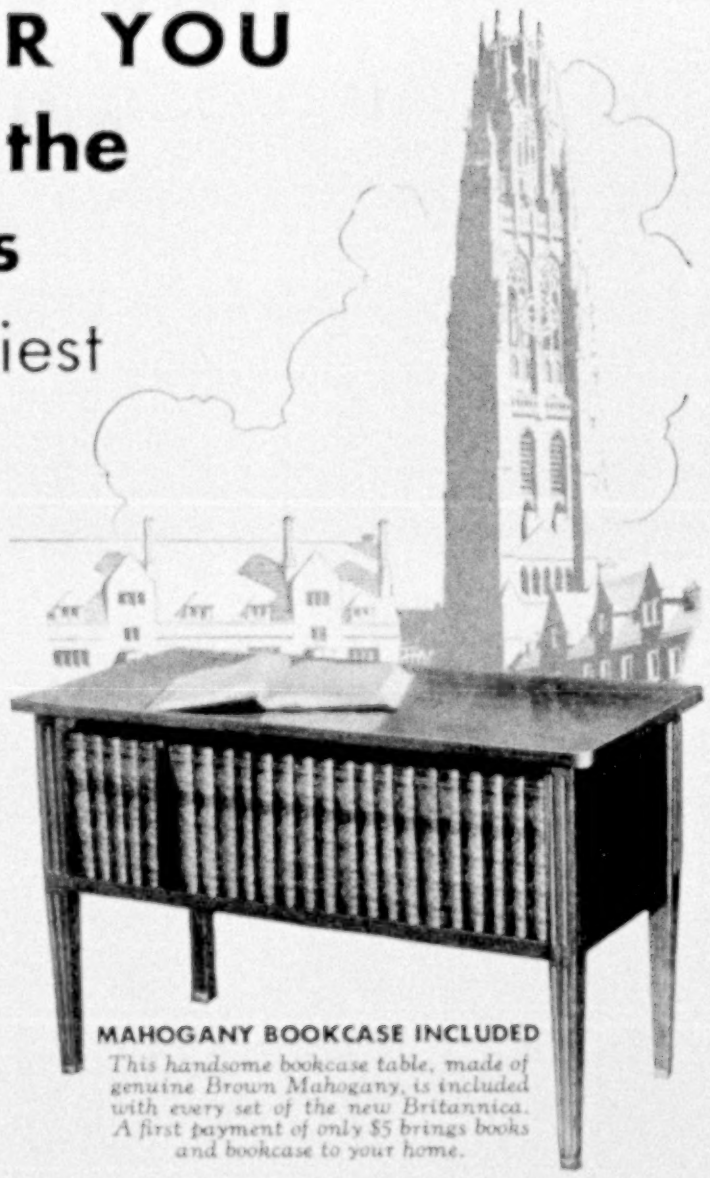

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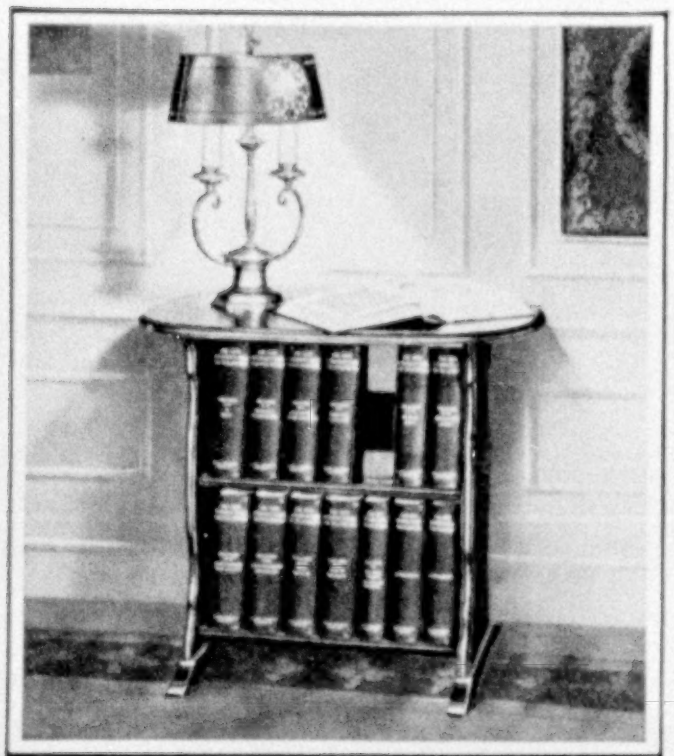

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DON'T *cover* the worn spots

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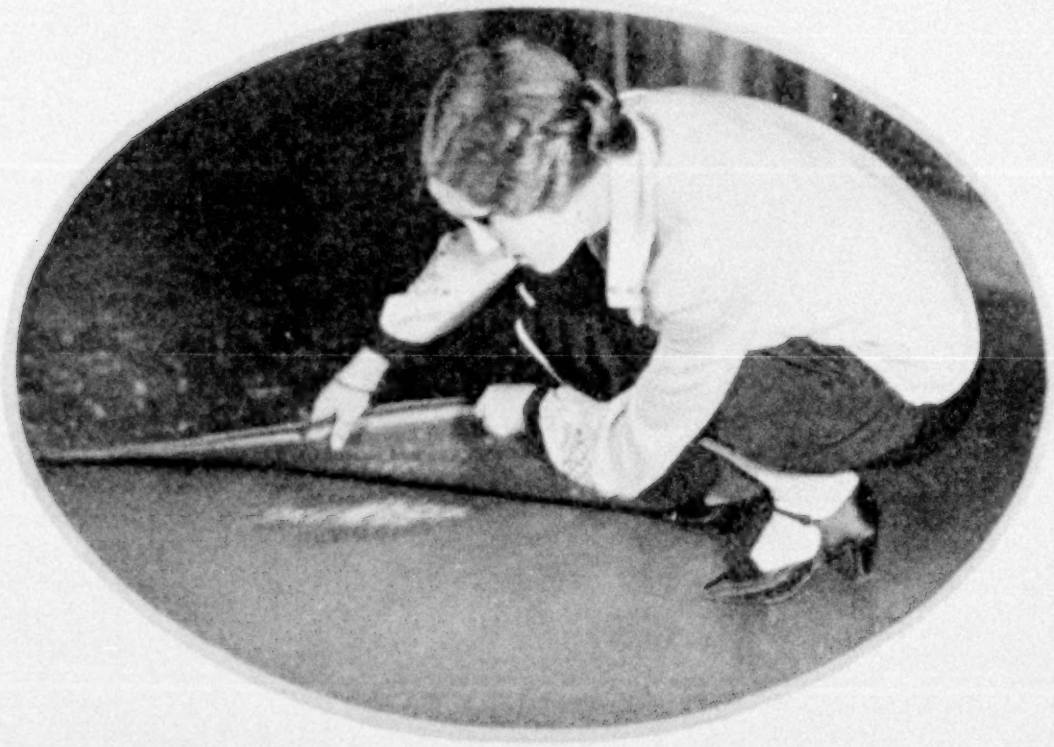

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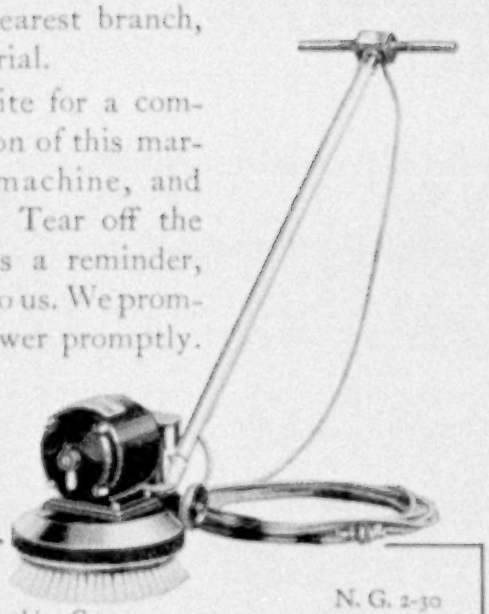

N. G. 2-30

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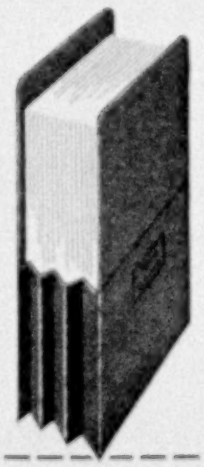

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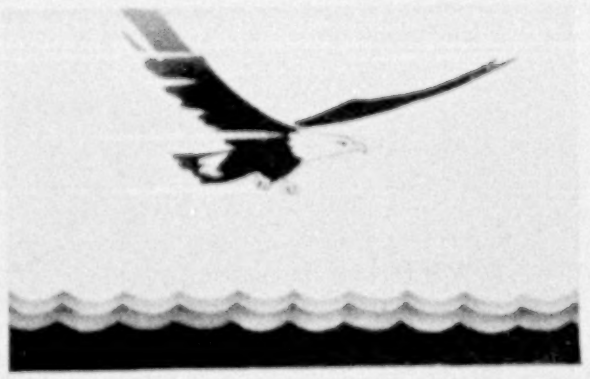

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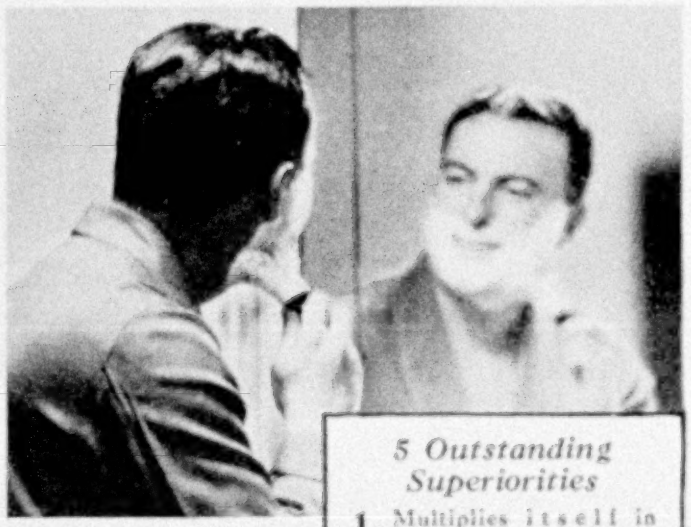

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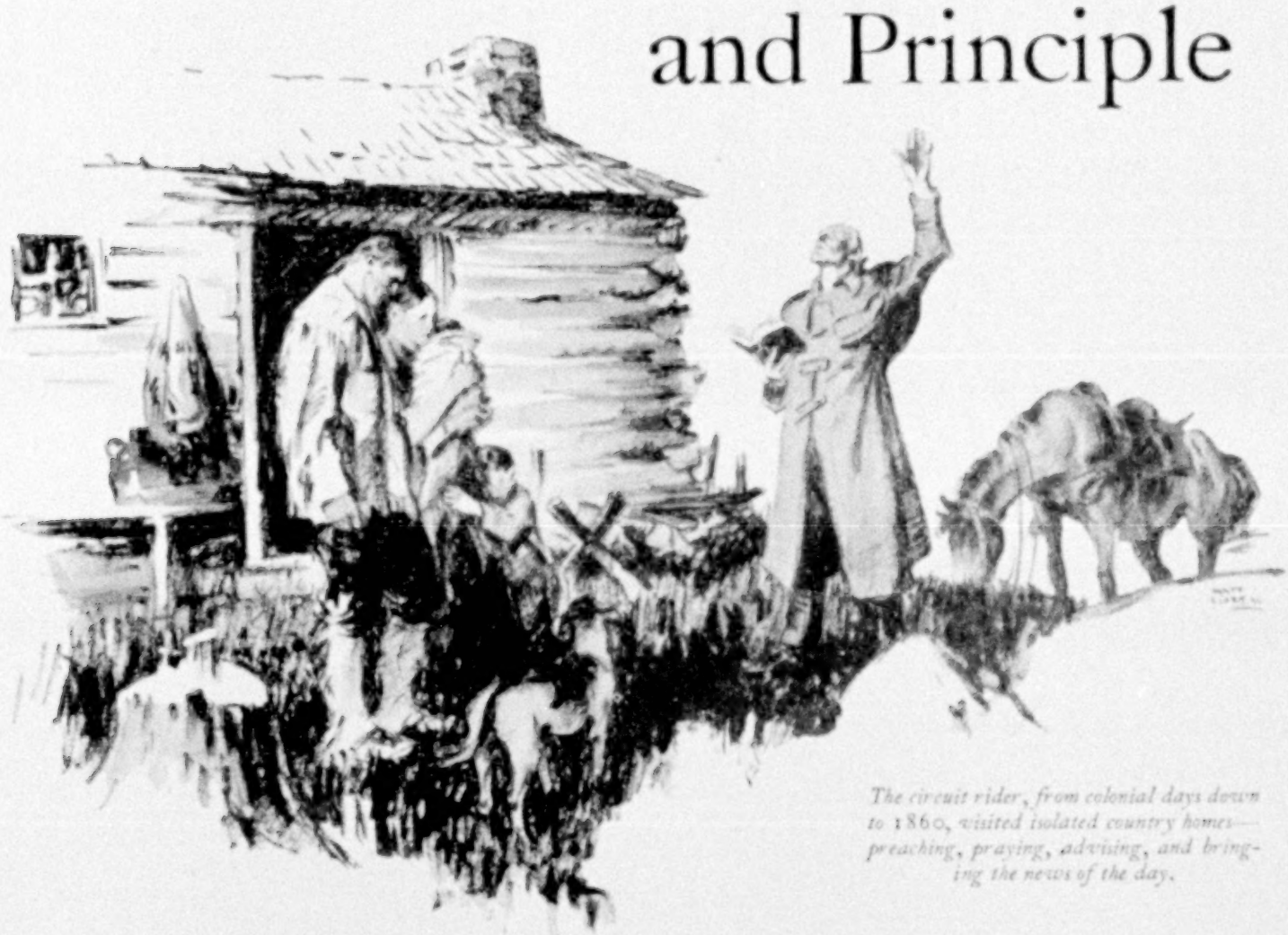

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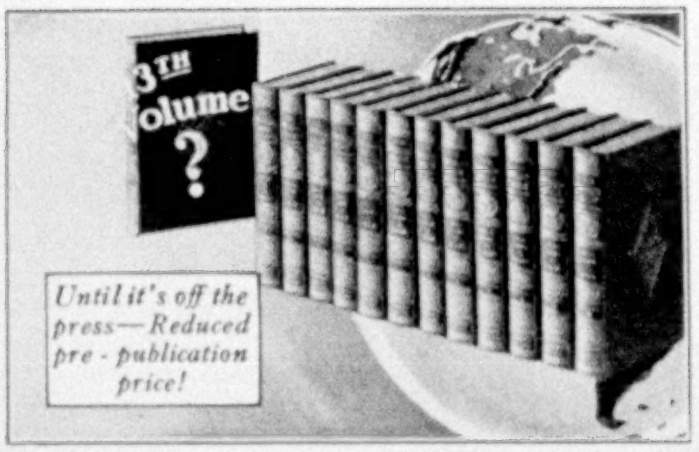

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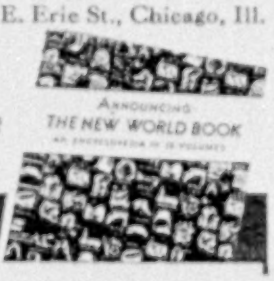

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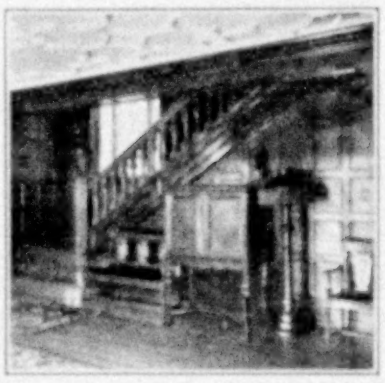

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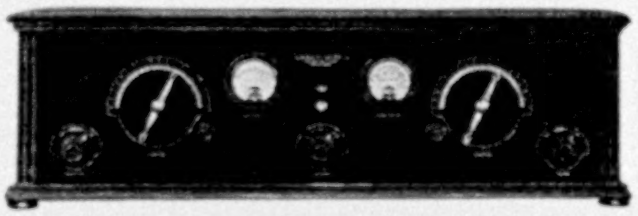

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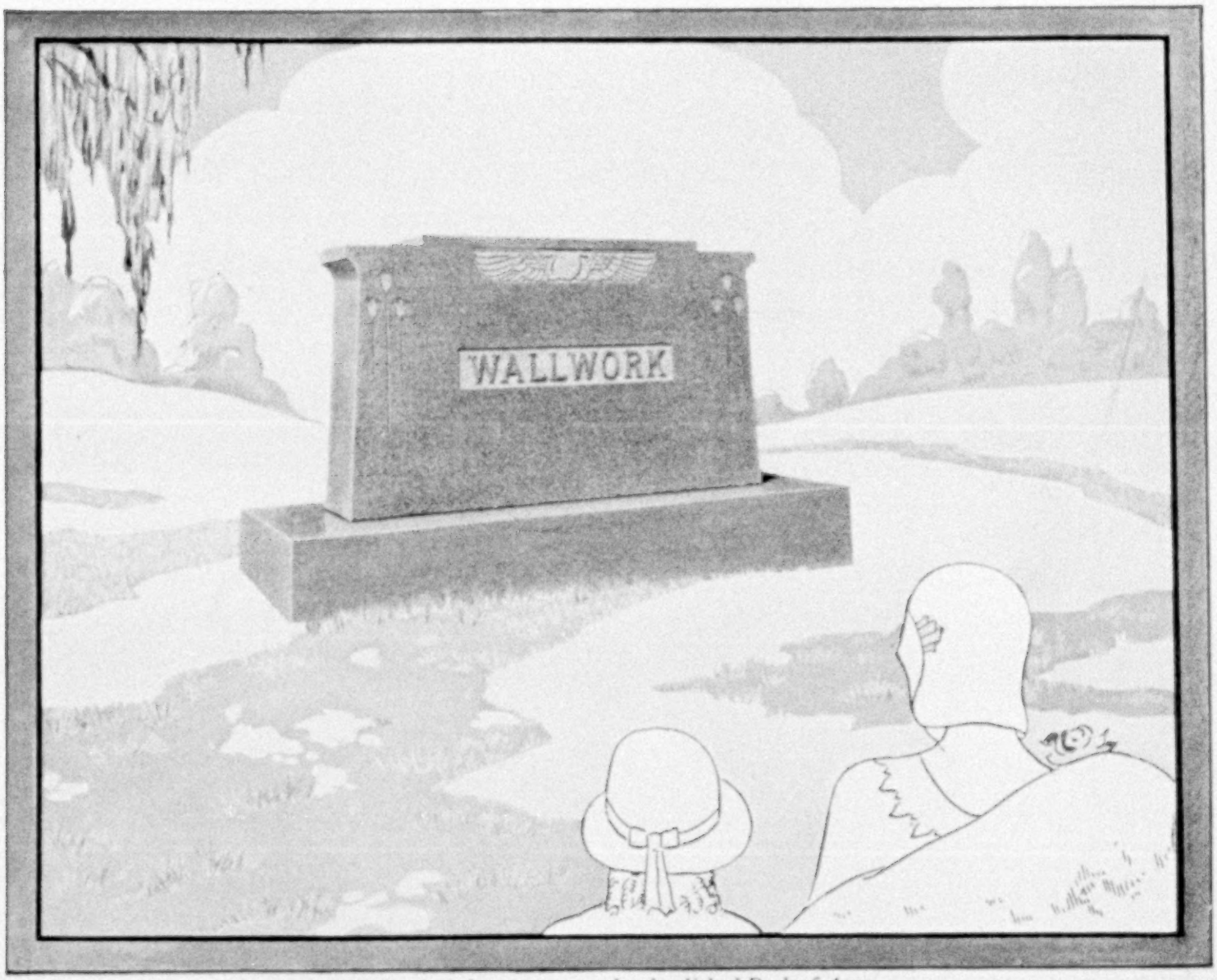

Illustration shows an example of polished Rock of Ages

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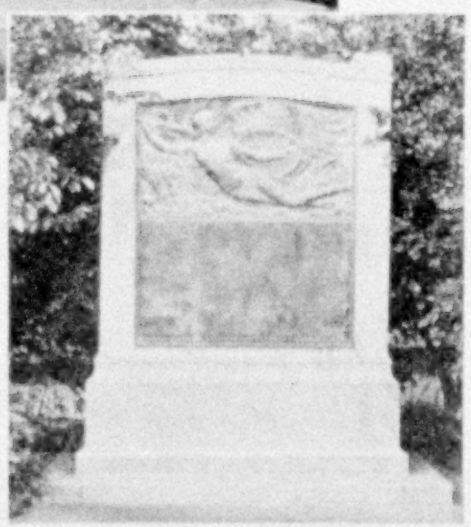

Above:
Impressively wrought of Stony Creek Granite, the Thorpe and Chamberlain Memorial is a beautiful tribute in Lakewood Cemetery, Minneapolis.

At right:
A. A. Weinman, sculptor, created this War Memorial at Forest Hills, Long Island, New York. It was executed in Stony Creek Granite.

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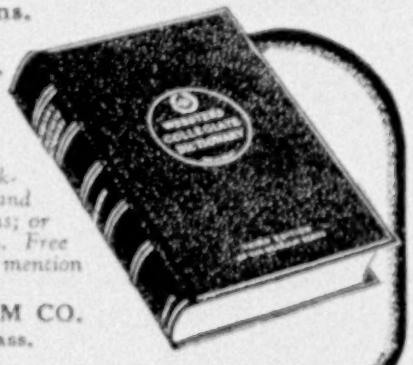

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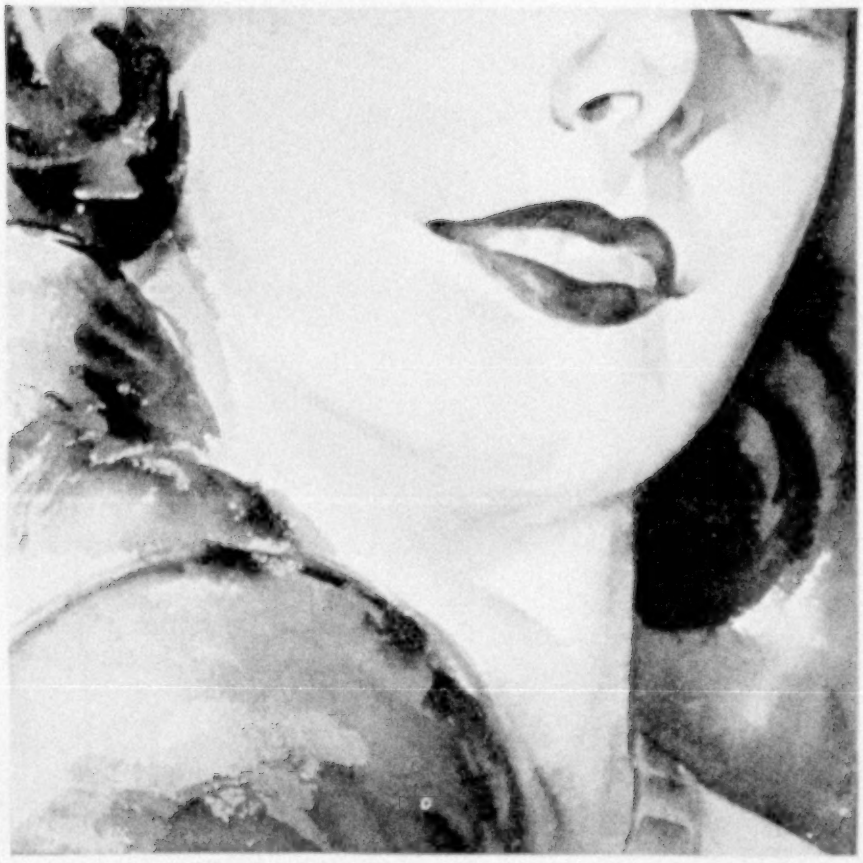

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When you brush your teeth, simple precaution urges that you brush them with Forhan's. Used with massage at the time of brushing, it helps to restore the glow of health to tender gums—aids gums which are firm and sound to keep their health throughout the years.

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Any mouth may have Pyorrhea and at forty the odds are:

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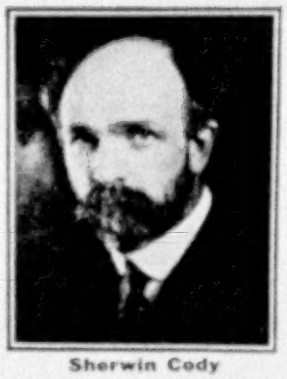
...your teeth are only as healthy as your gums

Do You Make these Mistakes in ENGLISH?



Sherwin Cody

MANY persons say "Did you hear from him today?" They should say "Have you heard from him today?" Some spell calendar "calender" or "calander." Still others say "between you and I" instead of "between you and me." It is astonishing how often "who" is used for "whom," and how frequently the simplest words are mispronounced. Few know whether to spell certain words with one or two "c's" or "m's" or "r's" or with "ie" or "ei." Most persons use only common words—colorless, flat, ordinary. Their speech and their letters are lifeless, monotonous, humdrum.

Every time you talk, every time you write, you show what you are. When you use the wrong word, when you mispronounce a word, when you punctuate incorrectly, when you use flat, ordinary words, you handicap yourself enormously. A striking command of English enables you to present your ideas clearly, forcefully, convincingly. If your language is incorrect it hurts you more than you will ever know, for people are too polite to tell you about your mistakes.

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Your Board of Health and your Health Commissioner may need additional ordinances and appropriations in order to expand their work. Remember—they cannot work without tools! Back them up.

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Whitman's Sampler as a Valentine is an example of 1930 good taste and good sense. America's favorite!

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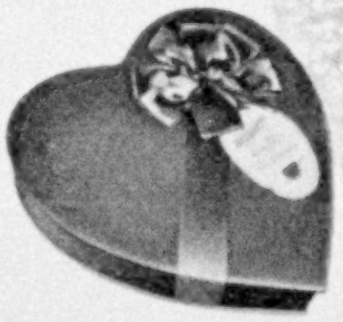
***The* Winsome Valentine**



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A feminine favorite because of its charming appearance and delightful assortment. Then too, the metal box is so useful.
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VOL. LVII, No. 2 WASHINGTON FEBRUARY, 1930

THE NATIONAL GEOGRAPHIC MAGAZINE

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SEEKING THE MOUNTAINS OF MYSTERY

An Expedition on the China-Tibet Frontier to the Unexplored Amnyi Machen Range, One of Whose Peaks Rivals Everest

BY JOSEPH F. ROCK

Leader of the National Geographic Society Yünnan Expedition, 1927-1930

AUTHOR OF "LIFE AMONG THE LAMAS OF CHONI," "THROUGH THE GREAT RIVER TRENCHES OF ASIA," "THE LAND OF THE YELLOW LAMA," ETC., IN THE NATIONAL GEOGRAPHIC MAGAZINE

With Illustrations from Photographs by the Author

"TO-DAY the map has no more secrets." Idle minds repeat that parrot phrase. But who knows all Tibet, or its far-away frontiers on western China? Even its own prayer-muttering tribes know only their own bleak, wind-swept valleys.

After dangerous, difficult months, I reached the headwaters of the 2,000-mile-long Yellow River and the towering, unexplored range of the Amnyi Machen. Twenty-eight thousand feet, or almost as high as Everest, its tallest peak lifts its snow-white head, majestic as the Matterhorn. Here, in remote, almost inaccessible valleys, I found countless wild animals still unafraid of man, peaceful as in Eden. Through deep, tree-lined chasms roared the upper reaches of the mighty Yellow River, flowing here *at an elevation of 10,000 feet above the sea!* Here, in July, was ice, and flowers bloomed in the snow.

WORLD MAP SECRETS ON THE CHINA-TIBET FRONTIER

And time turns back a thousand years when one talks to the superstitious and vexatiously inquisitive, suspicious folk who inhabit this lonely nook of the world.

"The earth is flat," they say. "In its middle stands a big mountain. The sun sets by going behind this.

"In far-away lands, men fly, we have heard. But in big eagles; if not in eagles, then in something that must be covered with eagle feathers. And in other lands there are men with the heads of dogs, of yaks and other beasts."

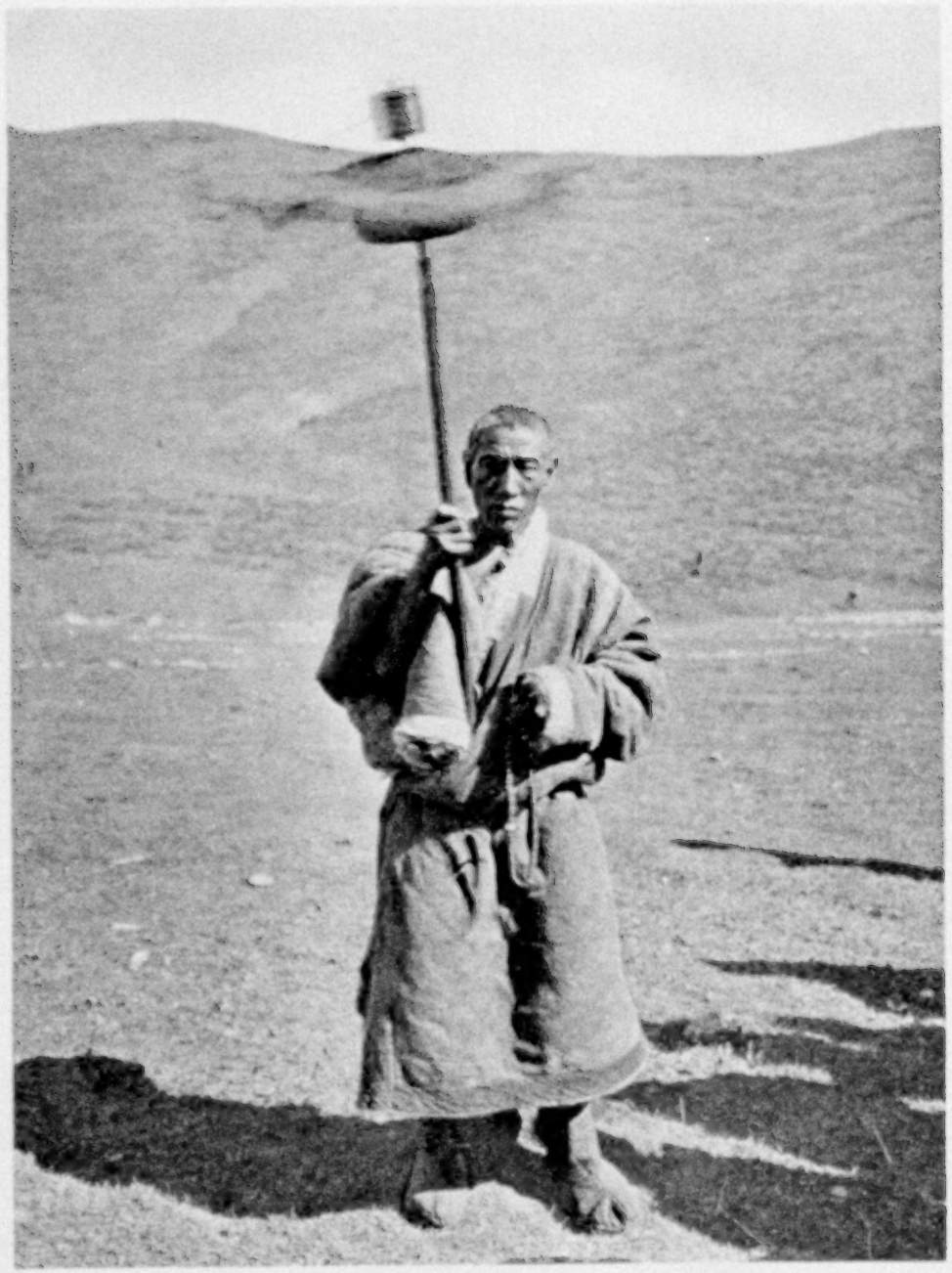
A miserable land it is, of poverty and incredible filth; a land cut off from all the modern world; a region which, for uncounted centuries, has had its own forms of government, of religion and social customs; yet a region which knows no railway, no motor car, no radio, or aught of all that science and invention have given the world since Marco Polo's day.

THE FIRST WHITE MAN TO APPROACH THE AMNYI MACHEN FROM THE EAST

Into this region no Chinese dares venture. Ninety thousand or more of the warlike Ngoloks live here, and other tribes of Tibetans, with whom they quarrel and fight. Yet of these local wars, not even an echo ever reaches the outside world. Here I saw men with spears 30 feet long, and a room in a lamasery wherein more than

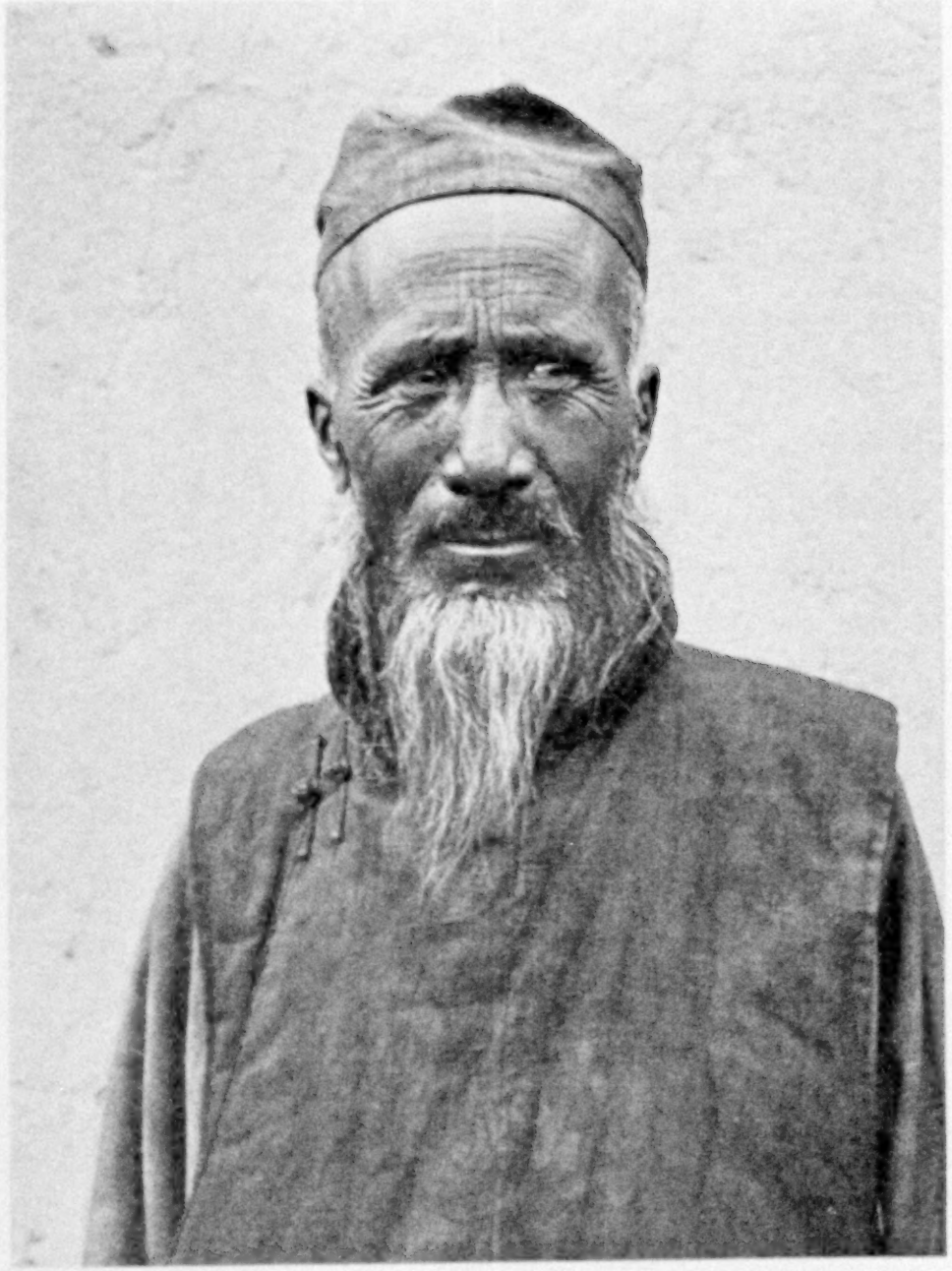
MEMBERS OF THE EXPEDITION NEAR CHONI, IN KANSU PROVINCE

Some of Dr. Rock's Nashi assistants, who accompanied him from Yünnan overland to the Yellow River at Radja, and to the Richthofen Range and borders of the extreme southwest of Mongolia.



A DEVOUT TIBETAN WHIRLS A DOUBLE PRAYER WHEEL

The smaller upper wheel, of silver, revolves separately from the lower; but each contains a roll of paper on which is printed the standard formula, "Om mani padme hum." Each time either wheel revolves the Tibetan is credited with a prayer, according to his belief. This man is a Drokwa, or nomad Tibetan.



A VENERABLE MOSLEM OF OLD TAOCHOW

He belongs to the New Sect, or Sin Chiao, that believes in a savior who lives in Old Taochow and who is known as Jesus or Aissa. The sect also believes in reincarnation. These Mohammedans trade exclusively with the Tibetan nomads, selling brass and copper caldrons, pots, kettles, and barley, taking in exchange wool, furs, and musk.

NOMAD PILGRIM WOMEN AT ANGKUR LAMASERY, IN CHONI

These Tibetan women, with rosaries and prayer wheels, are from the grass lands. They were blessed by the Labrang Buddha, who had fled to Angkur Lamasery during the Tibetan-Mohammedan war (see text, page 140).

50 imported clocks were ticking, no two keeping the same time! No, our world map is not yet without its secrets.

The great Amnyi Machen Range is shown on modern charts of Asia, though it is usually incorrectly spelled Amne Machin. It lies west of the great bend of the Yellow River (Hwang Ho) within the Koko Nor territory, something more than 1,300 miles westerly from Shanghai and 1,200 miles in a northerly direction from Rangoon. It is this range which forces the Yellow River to describe such a large bend (see map, pages 138-9).

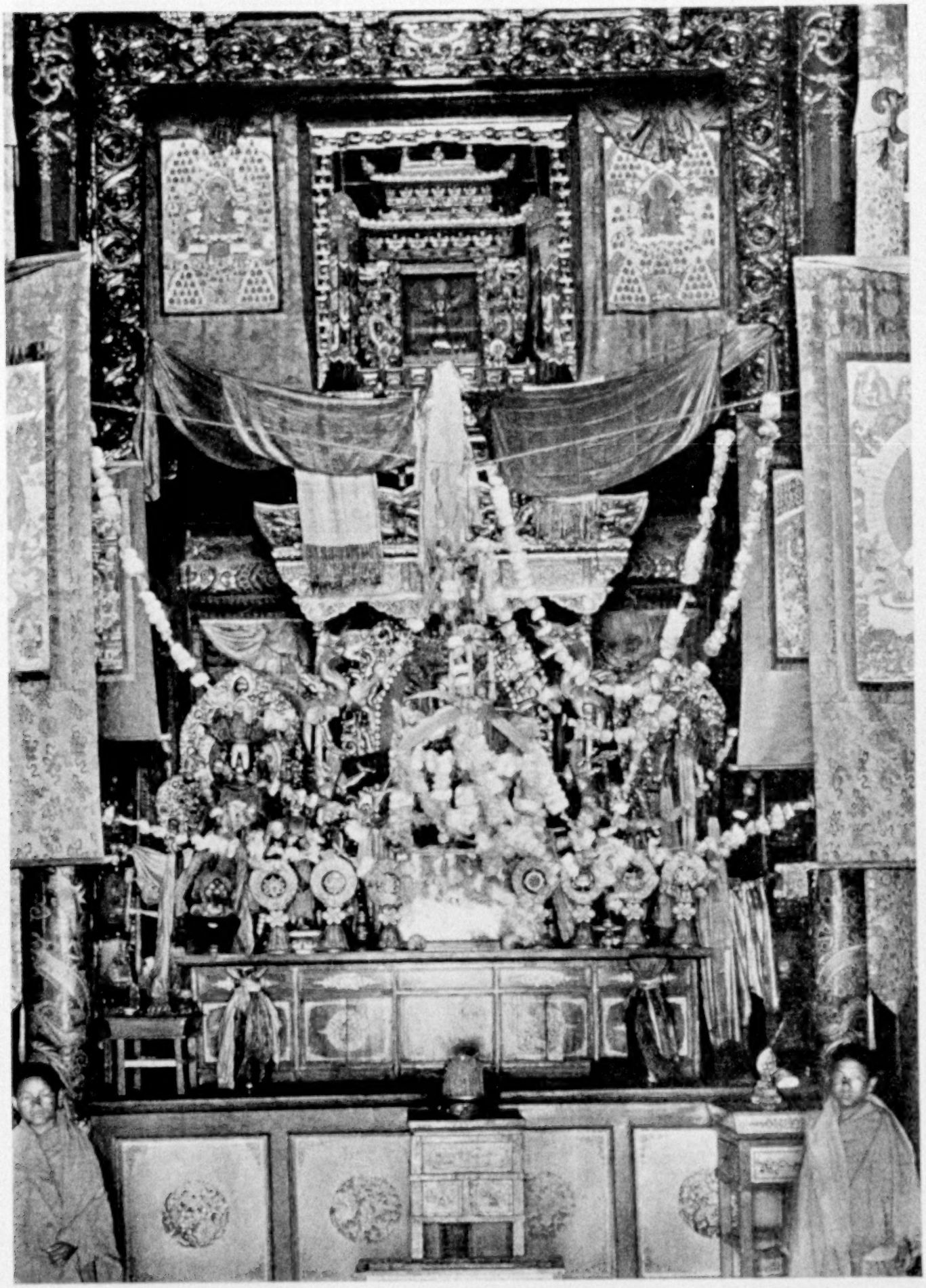
Except for occasional wandering missionaries, no whites ever make this hard, perilous journey to the Chino-Tibet frontier. The Russian explorer Roborovski, in the winter of 1895, tried to reach the Amnyi Machen, but was attacked at a spot northeast of the Mangun Pass and driven back by the "Tanguts," the Mongolian name for Tibetans.

My own visit, what from extraordinary hardship and the perils of bandits, was so brief that I could make only limited observations. So, as yet, the world knows only from hearsay of all the Amnyi Machen's mysterious valleys, its lawless Ngolok tribes, and the queen who was supposed to rule over them.

That it fell to my lot to reach this forbidden stronghold of the Ngoloks was due to a chance encounter, back in 1923, with that famous British explorer, Gen. George Pereira. On my way from Burma to southeast Tibet, as leader of an expedition for the National Geographic Society, I met the English traveler at Tengyueh, in Yünnan. He had then recently completed his now historic march from Peking (Peiping) to Lhasa, and, during our visit, he told me of an amazing landmark passed on his westward journey—the great snow-capped Amnyi Machen Range, which he saw from a distance of more than 100 miles.

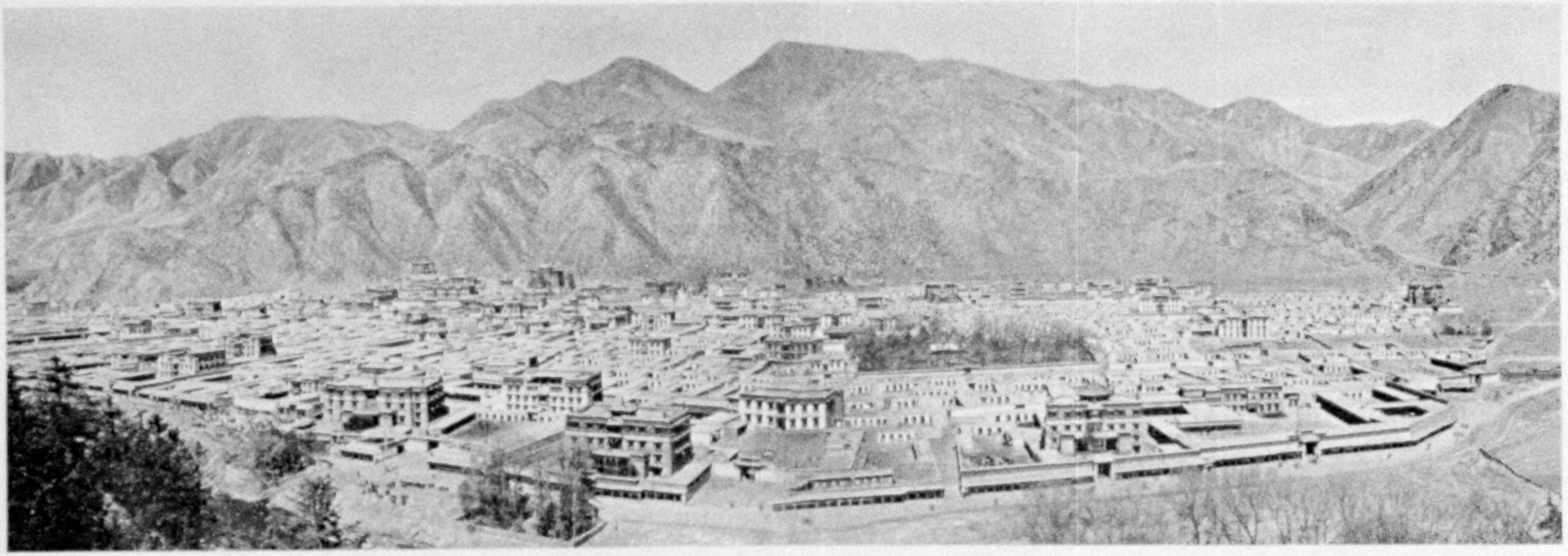
Very likely, he remarked, the Amnyi Machen, when surveyed, might prove higher than Mount Everest. He also spoke of the turbulent Ngolok tribes and their queen, and of his own ambition to attempt a journey of exploration to their country.

But God disposes. General Pereira died



THE GREAT LABRANG BUDDHA'S PRIVATE CHAPEL

The *Dju Kung*, or Lord's House, affords an impressive example of sumptuous temple decoration. The garlands hung on strings before the altar are from seeds of *Oroxylum indicum*, the East Indian trumpetflower.

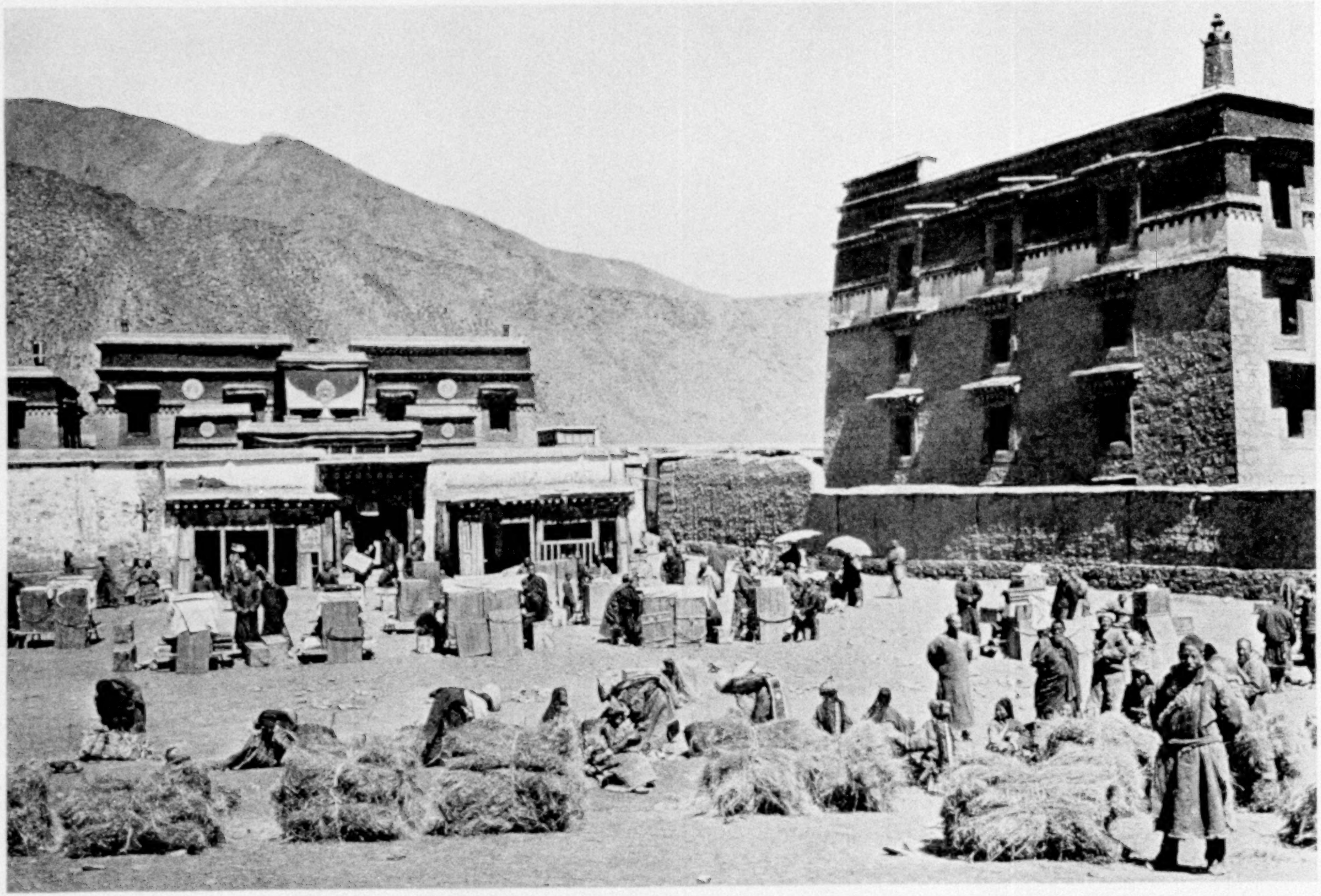


THE NORTHEASTERN END OF LABRANG MONASTERY

The religious community is surrounded by low, narrow sheds containing prayer wheels made of yak hide, gilded and painted with the sacred formula "Om mani padme hum." The lamasery houses nearly 5,000 monks (see, also, text, page 145).

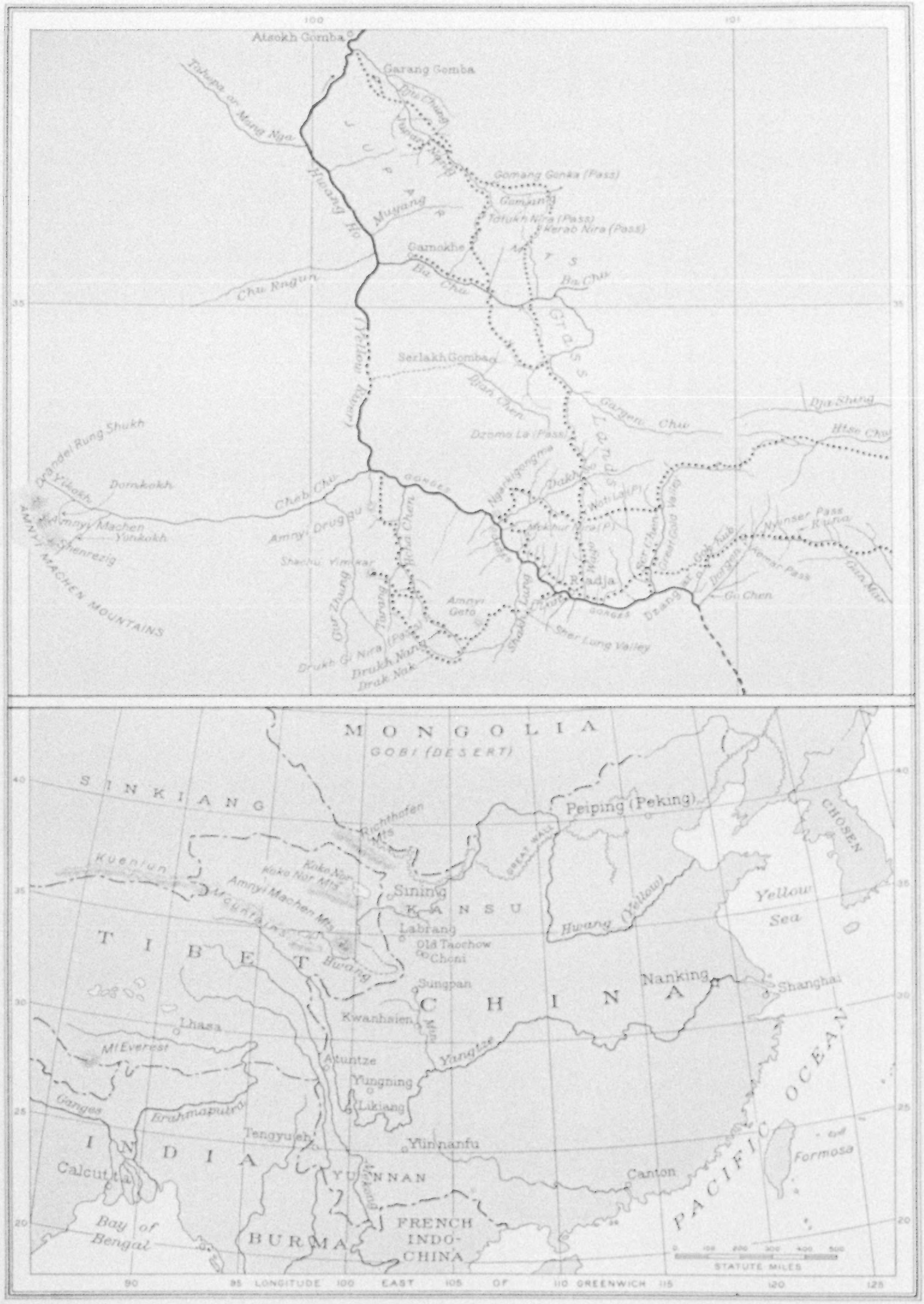
AT HIGH ALTITUDES THE CHINA-TIBET FRONTIER IS A COLD AND EMPTY COUNTRY

Filing through Shawo Valley in the month of May, the author's yak caravan marched at an elevation of 11,500 feet. This point was reached six days west of Labrang, on the trip to Radja.

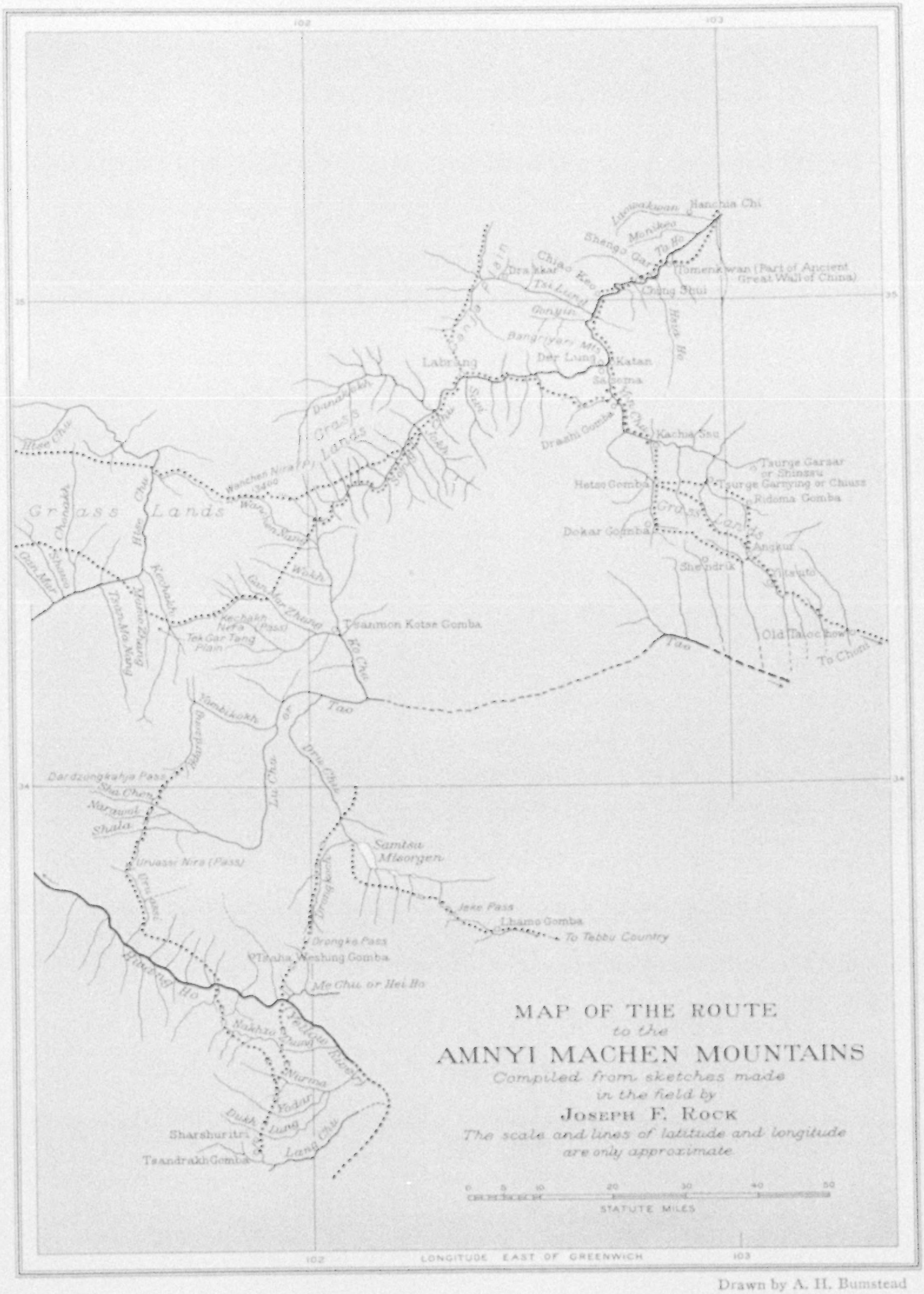


A PUBLIC MARKET BEFORE THE LABRANG MONASTERY

Venders display their wares in small wooden booths, which are stored in the near-by lamasery when not in use. The bleak nature of the region is indicated by empty hills in the background.



FROM CHONI THE AUTHOR TRAVELED WESTWARD TOWARD THE AMNYI MACHEN AS FAR AS SHACHÜ YIMKAR:



Drawn by A. H. Bumstead

ROUTES TO THE SOUTHEAST INDICATE SIDE EXCURSIONS MADE BY DR. ROCK, TO BE DESCRIBED SUBSEQUENTLY

THREE LABRANG GIRLS OF THE LHARDI TRIBE

Worked into their odd and cumbrous hairdress are ornamental disks of brass sewn on bright-red strips of cloth. One of the girls wears a large sea shell.

soon afterward on the cold and hostile Chino-Tibet frontier, at almost the end of his third extraordinary overland journey across China.

But it was his passing glimpse of far-away Amnyi Machen and his talk of its unsolved riddles that inspired me to see for myself, if humanly possible, something of its mysteries and magnificence.

Many months later, back in China now for the Arnold Arboretum of Harvard University, I found myself on a botanical and ornithological expedition, with authority to explore, if I could, the Amnyi Machen Range. From Yünnanfu I started with 12 faithful Nashi helpers, veterans all of a previous far journey into China.*

As a base, I first chose Sining, in northwest Kansu. However, after more than 15 weeks of weary marching and casual games of "I spy" with pursuing bandits, we reached the town of Choni and decided to make our base there. It was now late in April.

The best way to reach Amnyi Machen, said the Choni people, was to go by way of the grass lands to Radja Gomba, on the east bank of the Yellow River. But it was easier to hear *how* to go than it was to go. And many a prayer wheel was to rattle and whirl, and much muddy water run down the old Yellow River, before my eyes were to rest on the chaste white peaks of Amnyi Machen.

AN AUDIENCE WITH A BOY BUDDHA

Prince Yang Chi-Ching of Choni, a feudal stay-at-home, could help me not at all.† However, he was moved to mention the great Living Buddha of Labrang Monastery, the incarnation of the God of Learning, at the moment sheltered in the small monastery of Angkur Gomba, on the Prince's domain. Thither I went, after obtaining a letter of introduction. Angkur Gomba nestled at the foot of a limestone cliff in a narrow valley.

* See, also, "Banishing the Devil of Disease Among the Nashi," by Joseph F. Rock, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1924.

† See, also, "Life Among the Lamas of Choni," by Joseph F. Rock, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1928.

I learned that the 12-year-old Living Buddha had retired to this place because of a war raging between his people about Labrang and the Moslems of Sining, led by General Ma Chi, ruler of the Koko Nor country.

But, insignificant as Angkur Gomba itself was, one quickly discerned that it now sheltered an important personage. From the quarters assigned us, in one end of the lamasery, we could see over the walls and observe the motley concourse of people doing obeisance to the Living Buddha. An unbroken line of grassland nomads—men, women, and children—moved around the lamasery, making prostrations or turning prayer wheels and muttering the eternal monotonous phrase, "Om mani padme hum" (O, the Jewel in the Lotus, Amen).

THE LIVING BUDDHA OF DZANGAR MONASTERY IS EIGHTY-ONE YEARS OLD

Seated before his Mongol tent, the Buddha is attended by two monks and a boy Buddha. He is garbed in red and yellow and wears a miter on his head.

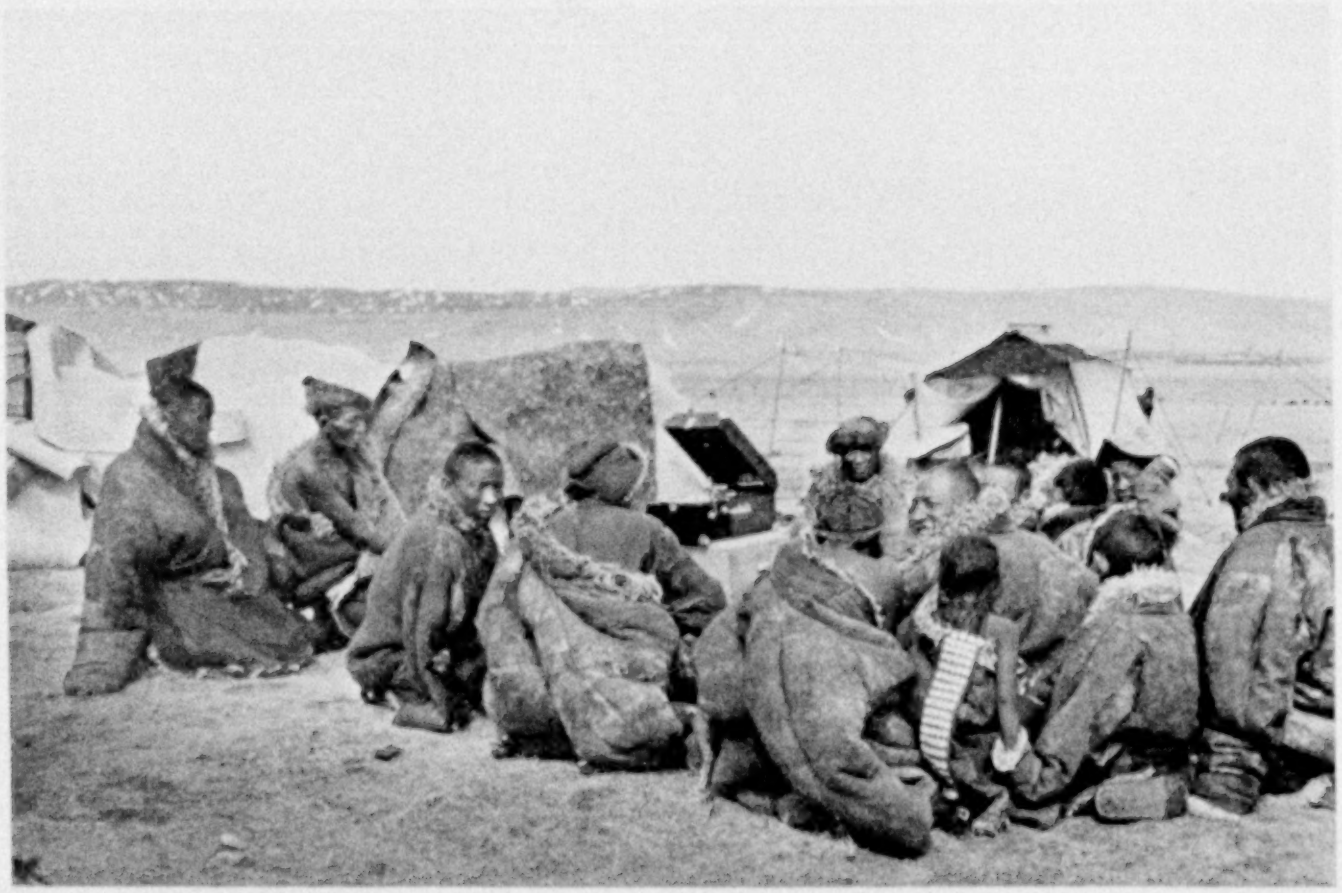
Under a shed near our quarters were suspended hundreds of yak and mutton shoulder blades with prayers printed on them. After the pilgrims had made their cash offerings to the boy Buddha and been blessed, they crowded into this shed to rattle these dry, printed bones. A quick, easy way to pray! This ritual of bone-rattling, with the noise of trumpets, cymbals, and conches, filled the air as we went to our audience with the Buddha.

Enthroned on the dais, clad in yellow satins and with the miter of a Living Buddha on his brow, sat the boy god. As we came in he arose slowly and bowed. I presented him with the usual *kattak*, or silk scarf, while one of my men lifted up a tray of presents, which was accepted for the Buddha by an attendant lama. My cook, knowing the required Tibetan dialect, acted as interpreter. Through him I explained to the boy Buddha, or rather to his father, who waited on him, my reasons for wishing to explore the Amnyi Machen, and requested a letter to the Buddha of Radja and also letters to some of the Ngolok chiefs.

I readily got the letter to the Buddha of Radja Gomba, but some weeks were to elapse and a bloody war was to be fought between the nomad Tibetans and the Moslems of Sining before I obtained

TIBETAN NOMADS CARRY SWORDS AND RIFLES

On their rifles members of the Sokwo Arik tribe fasten wooden prongs, on which they rest the weapons when firing. They never fire a rifle without using such a rest.



A PORTABLE TALKING MACHINE AMAZED AND DELIGHTED THE TIBETANS

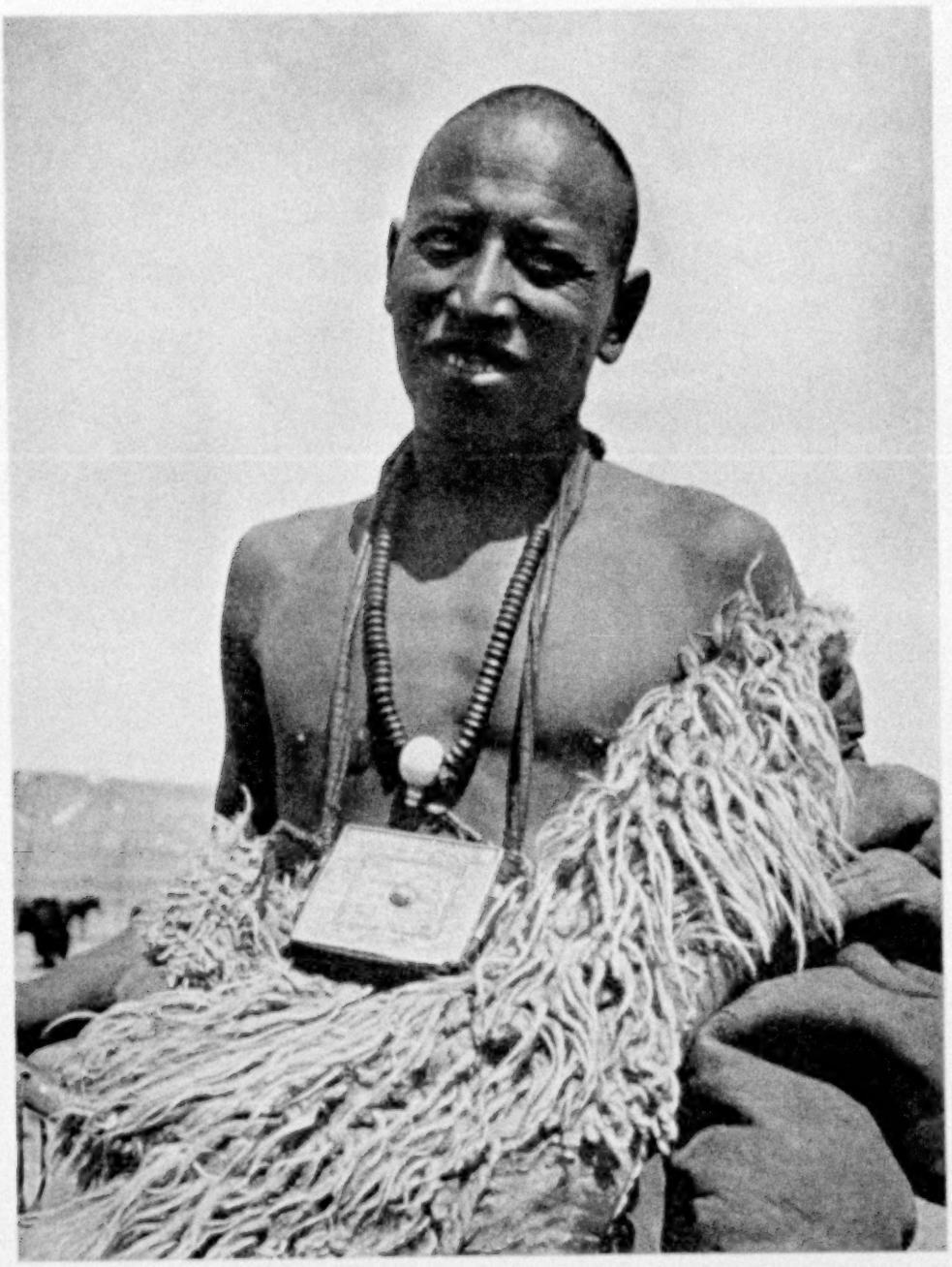
Nomads of the Sokwo Arik (Tibetan) tribe are listening to the Caruso record, "La Donna è Mobile," at the author's camp in the grass lands of the Sokwo Arik winter quarters, four days west of Labrang. The natives called the phonograph a Russian magic box.

my letters to the Ngolok chiefs.

To give the reader a more graphic picture of how precarious life is in these wilds, let me hastily sketch some aspects of the war which interrupted my progress toward the Amnyi Machen.

A SLAUGHTER RECALLING THE DAYS OF GENGHIS KHAN

When the fight started, the Tibetans took the offensive and drove the Moslems out of Labrang; but soon the latter returned with reënforcements and defeated the Tibetans in fierce battles fought on the Ganja Plain and in Song Chu Valley. In these frightful slaughters, however, the wild Ngura, nomad Tibetans, made a most dramatic showing; they charged against the Moslems at full speed on horseback, impaling them on their 30-foot lances like men spearing frogs. Far more Moslems were killed with these spears than with guns.



THE SON OF ARIK JOJORO, SOKWO ARIK NOMAD CHIEF, REVEALS NEGROID FEATURES

He wears a single sheepskin garment. About his neck is a rosary bearing a silver talismanic box.

Under any skilled leader the Tibetans could have whipped the Moslems; but there was no coördination among these wild tribes. In fact, during the fight, the Amchoks, although fighting with the Tibetans, took advantage of the battle's confusion to sneak back and rob the tents of their own allies.

Many of the Tibetans who fell alive into enemy clutches were hung up by their thumbs, disemboweled alive and their abdominal cavities were then filled with hot stones.

The Kansu Government troops had promised to help the Tibetans, but they seemed to have no stomach for all this slaughter; anyway, they failed to appear. Finally, despite fierce resistance by the brave but unorganized tribes, the better-trained Moslems routed them completely. Labrang remained in Mohammedan hands. Hetso monastery was plundered and a Living Buddha with 15 monks was slain. Raiding the grass lands, the Moslems had slaughtered women and children as in the ruthless days of Genghis Khan.

TIBETAN HEADS DECORATED GARRISON WALLS

Frightful, indeed, was the aspect of Labrang after the fight. One hundred fifty-

A BUDDHA'S STEWARD GAVE A TEA FOR THE AUTHOR IN THIS TENT

Because of the extremely unsanitary nomad tent life, official teas in Tibet are an ordeal to the rare visiting foreigners (see, also, text, page 152).

four Tibetan heads were strung about the walls of the Moslem garrison like a garland of flowers. Heads of young girls and children decorated posts in front of the barracks. The Moslem riders galloped about the town, each with 10 or 15 human heads tied to his saddle. Heavy tread the heels of the Kansu Mohammedans on these nomad people of Tibet.

Amid this carnage we were forced to give up for the time being any hopes of marching on to our difficult goal.

Glad to escape from a stricken land, I marched my little band north to camp and explore during the rest of the summer in and around the great Koko Nor and in the Richthofen Range. That journey is another story. Late in the fall we returned to Choni to winter. Here, during the long months, I talked with the lamas, attended their ritual dances and festivals, took many photographs with the help of Prince Yang, and gathered all the information I could about the Ngoloks. In the meantime, from the boy Buddha of Labrang I had obtained letters of introduction to the leading Ngolok chiefs, those ruling over the important Rimong, Kangsar, and Kanggan tribes, who have their camps west of the Yellow River and south and west of the Amnyi Machen Range.

THE START FOR THE AMNYI MACHEN

It was late in the spring, almost a year and a half after my start from America, when I was again ready to press on toward the mountains of mystery.

When we left Choni, we had supplies for a five months' march, including food, a photographic outfit, cotton for stuffing any birds collected, grass paper for packing plant specimens, powdered charcoal for packing seeds; also beans for horse feed and many presents for the important people we were to meet. As coined money is unknown in this part of the world, we carried much lump silver, cotton drill, sateen and other cloth, as well as needles and thread for use in barter.

Dressed in gray felt raincoats, well armed, and escorted by a cavalry guard, we made an imposing party as we marched out of the gates of Choni. We used yak carts to haul our supplies as far as the

THE LIVING BUDDHA OF DZANGAR RIDES IN A MULE LITTER

Lakatsang is accompanied by his steward, some monks, and a boy Buddha. The photograph was made in the grass lands below Kemar Pass, at an elevation of 12,400 feet.

old town of Taochow. From there to Labrang 34 mules carried our loads. At this influential monastery we spent nearly a week making plans to cross the grass lands on our way to the Amnyi Machen.

I engaged 20 armed and mounted men of the nomad Sokwo Arik tribe of Mongol origin to escort us and to supply 60 big yaks. We had also to buy yak-hair hobbles for the horses. These were used in the daytime, when the horses grazed. At night, to keep thieves from driving them off, we had to hobble them with locked irons.

LABRANG, ONE OF THE LARGEST MONASTERIES IN EASTERN TIBET

These days at Labrang taught me much of this bleak, dusty, religious stronghold, 8,585 feet above the sea. To-day nearly 5,000 lamas live in this huge monastery. Its site, once a great marsh, was changed into dry land by the prayers of a former Buddha, I was told (see pages 136, 137).

On a hillside opposite the monastery grows a forest of fir and spruce. It is of miraculous origin, says tradition. Long ago a famous monk, the founder of Labrang, got a haircut. His hair, scattered over the hillside, took root and produced this fine forest!

There are 30 large buildings in Labrang which contain chanting halls or which serve as the homes of Living Buddhas. Many hundreds of smaller buildings house the lamas. With their great wooden shutters, the houses look like jails.

Some of these structures are from four to five stories high. Some are red; others are yellow with green roofs. All seem very old. On a hillside, towering above all others, stands the residence and private chapel of the chief Buddha. Its roof is covered with gold sheets, or probably with bronze sheets over which gold has been plated (see page 135).

Five giant kettles, each six feet in diameter, equip a monster kitchen. Here food sufficient to feed 4,000 lamas can be boiled at one time. It usually consists of butter tea or rice gruel.

Amazing is the main chanting hall, which seats 4,000 persons. One hundred forty red columns, 40 feet long, support its

roof. In another hall, preserved in massive silver urns, are the remains of the four previous incarnations of a Buddha, the founder of Labrang, who traveled widely in Mongolia and China and gathered much silver used in building this monastery.

The big hall is unclean. After prayers the lamas are fed here, and the floor is thick with tea, rice gruel, and other food dropped there in years gone by and now trampled hard. About the padded strips of carpet on which the lamas sit, this ancient food is many inches thick.

I called on the Abbot in charge. He received us in his room, which was beautifully painted and paneled. On a shelf stood lovely porcelain bowls made during the reign of Kien Lung; others dated back even to Kanghshi. I also saw here handsomely carved silver chests containing gilded or gold images. There were also fine carpets, painted and lacquered tables, and other signs of wealth and plenty.

A TALK WITH THE ABBOT OF LABRANG

I had an extraordinary interview with the Abbot. Among other things, he asked me if I had ever been in a land where the people had the heads of dogs, sheep, and cattle. When I said that such people did not exist, he smiled politely.

"Oh, yes, they do," he said. "Our books tell of such people."

He also asked me what I thought about the shape of the world. He said he believed the earth was flat, and that in its center was a lofty mountain, behind which the sun disappeared and thus produced night. He also said that foreigners had verified the existence of this big mountain by flying over it. His simplicity and childlike credulity were astounding.

Adjoining this monastery is a trading village and the barracks of the Moslem soldiers. Here is incredible filth. Walls are built of sheep and yak bones. The ground is littered with bits of skin, legs, hoofs, and the bones of animals. Frozen dogs lie in the middle of the street, and there are dead birds and stagnant pools of blood from slaughtered sheep and yak, as well as entrails, bits of wool, and discarded parts of the slain animals, among which dogs and chickens prowl for food.

I hastened back to my clean quarters. Outside, the wind howled and drove filth-laden dust across a dreary landscape.

It was now the fifth of May, yet a blizzard raged. At dawn our 60 yaks were driven in by the nomad escorts. Accompanying me was an extraordinary American character, a missionary whom I found working among the people about Choni and engaged as Tibetan interpreter. He was dressed now in nomad garb.

THE EXPEDITION'S TROUBLES ARE NEVER OVER

I could hardly believe that, after the many months of delay, the day of departure was really at hand. But, of course, our troubles were never over. The nomads, familiar only with handling bags and bundles, did not know how to tie our boxes and Army trunks on the yaks, so many a load fell off and had to be tied on again. Soon our caravan was scattered out for a distance of a mile.

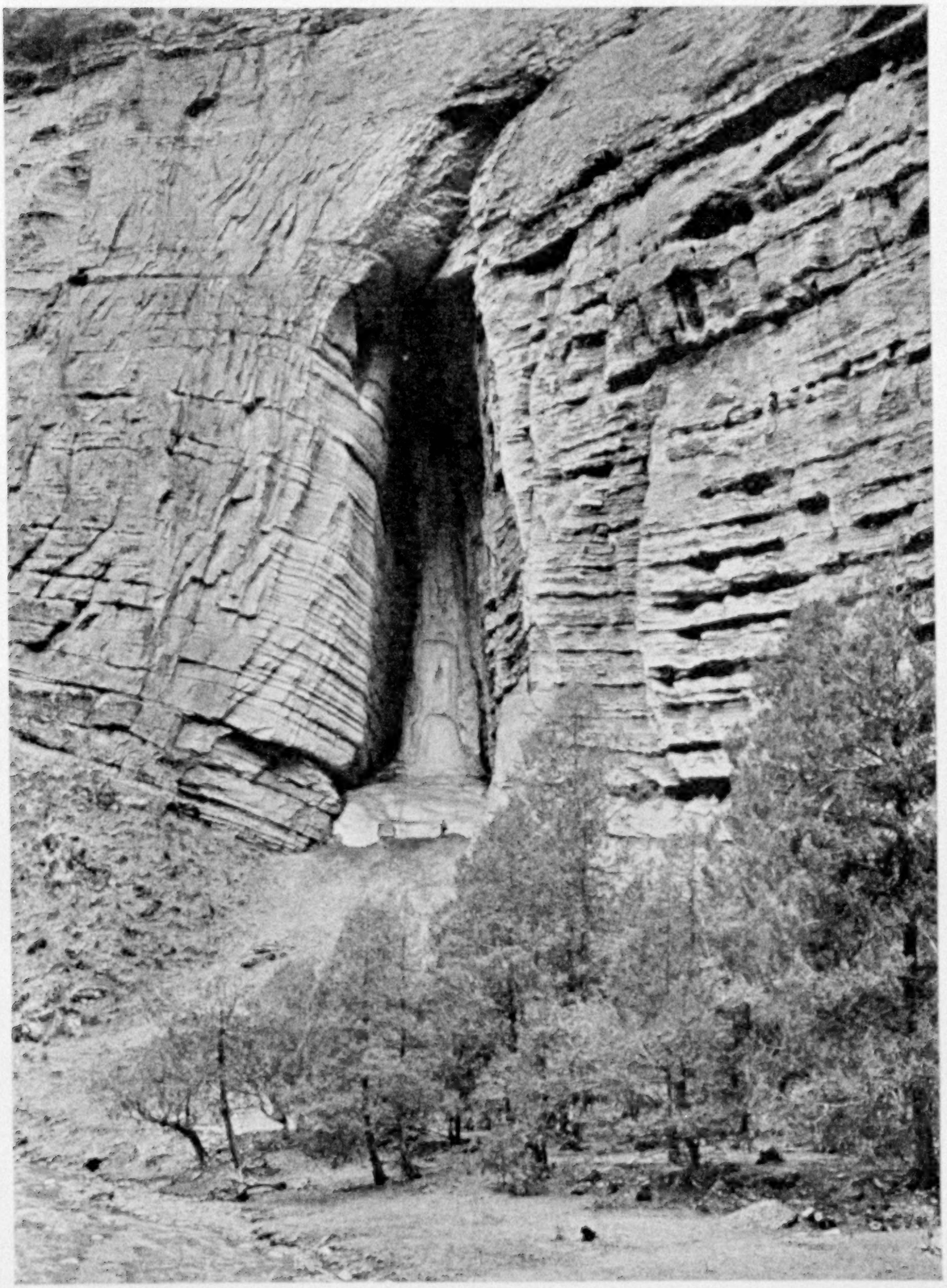
Out from Labrang the trail ran up a valley on the left side of the Song Chu stream. Natives ran out to gaze at us as we passed. Out of the Labrang Valley we emerged into the grass lands, or yet another broad valley. Here the fearless Ngura tribe had defeated the Moslems, and the grassy plain was still strewn with the bones of those who fell in that fierce fight (see, also, text, page 141).

Now we had indeed left the world behind. Slowly we made our way over the snow-covered valley of the Song Chu. Beside the loaded yaks the mounted nomads, clad in sheepskins and carrying rifles and their dreaded 30-foot spears, rode along, whistling (see, also, page 136).

Night came and we camped. In each yak's nose is a ring to which is tied a small rope; this, in turn, is tied to a long picket line.

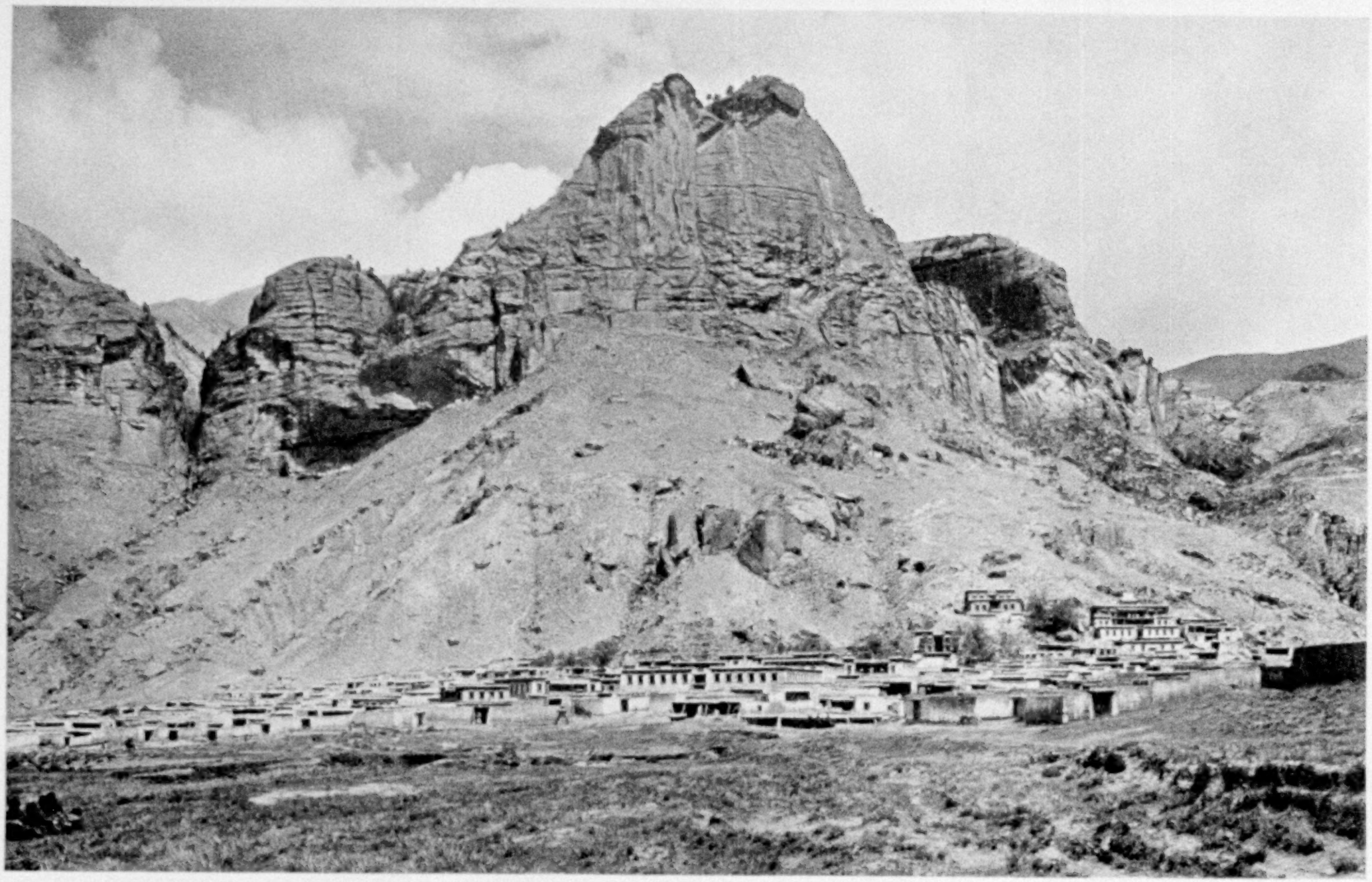
To start their fires the Tibetans used a crude sheepskin bellows. We put out sentries, many of whom had mastiffs with them. Great was the astonishment of the tribe when I played my phonograph and when, for the first time, the "canned" voices of Caruso, Melba, and others were heard in the high grass lands. The altitude of our first camp was 10,250 feet, estimated by boiling point.

I studied these Tibetan nomads. A swarthy, stalwart lot they were, wearing



A MARVEL OF THE SER CHEN GORGE, OR GREAT GOLD VALLEY

The awe-inspiring canyon has been cut by water from the red sandstone. In the walls of the canyon are many caves. A man stands at the edge of the glacier, which is discharging from the cavern in the background. Here junipers grow at 10,400 feet elevation (see, also, text, page 158).

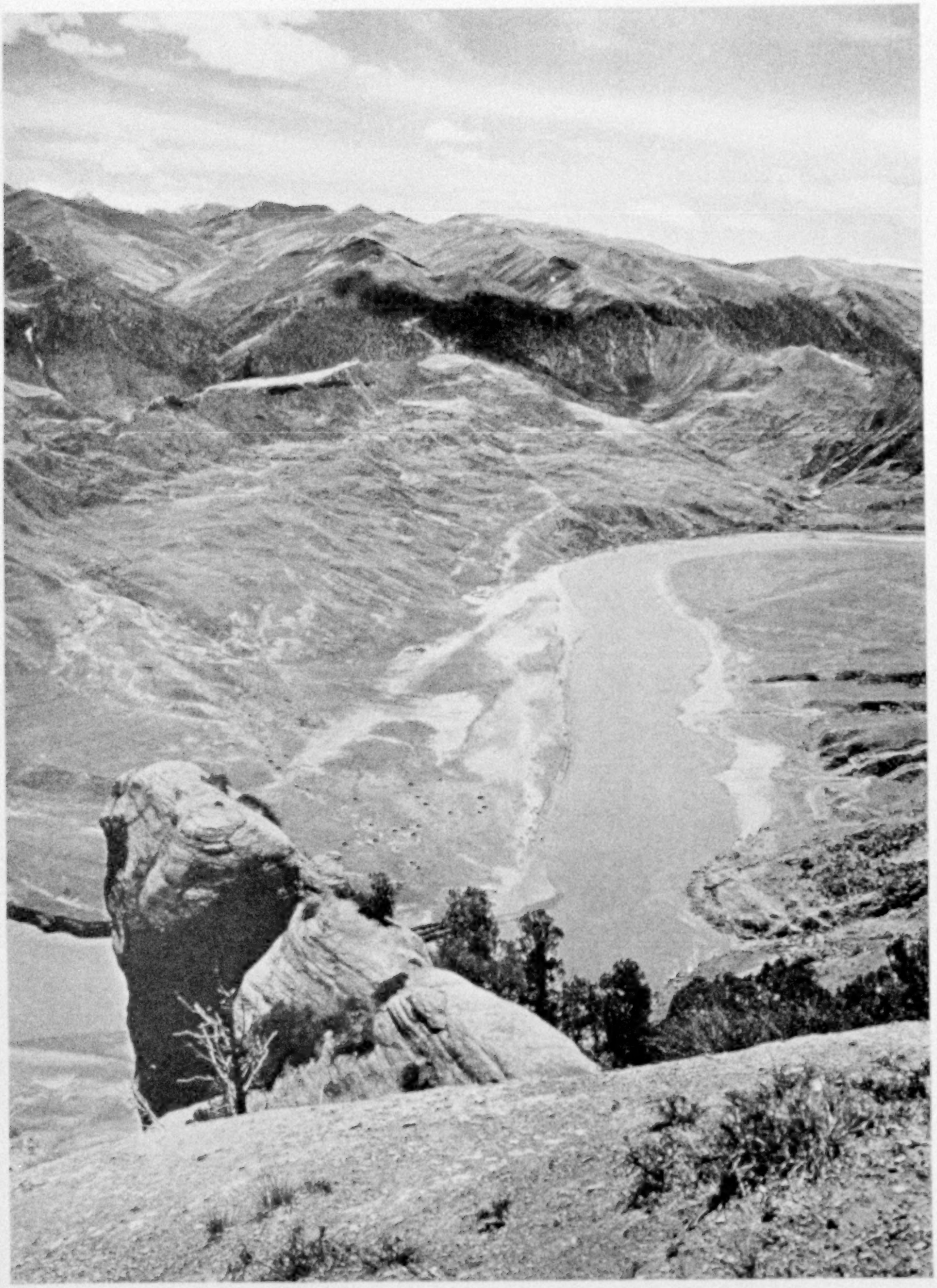


THE LAMASERY OF RADJA, NEAR THE HEADWATERS OF THE YELLOW RIVER

Standing 10,000 feet above the sea, at the base of a 1,500-foot bluff, only about two-thirds of this mysterious lamasery is visible in the photograph (see text, page 159). To the left, at the top of the slope and under the sheer rock wall, are the quarters of hermit monks (see, also, illustration, page 153).

THE AUTHOR'S IMPOSING YAK CARAVAN ASSEMBLED IN THE COURTYARD AT DZANGAR MONASTERY

Ready for the march to Radja, on the Yellow River, the yaks are all loaded. Each pack is guarded against rain by a heavy felt cover. From the roof, a Buddha and his steward enjoy the excitement of the start.



THE YELLOW RIVER, SEEN FROM THE SUMMIT OF AMNYI CHUNGUN, MOUNTAIN GOD OF RADJA

The highest point of the cliff that overshadows the Radja Lamasery is 11,500 feet above sea level. Black dots to the left of the river are the camp of Hdzanggur Ngoloks (see, also, page 157).

large sheepskin coats with long sleeves. When driving yaks, they slap the animals over the back with these sleeves. As soon as their tea had boiled, they took out a ladleful, put butter in it, then threw it out of their chief's tent, at the same time yelling prayers to the mountain god. They called all foreigners "Urussu," or Russians. My phonograph they called a "Russian magic box."

I slept lightly that night, what with barking dogs and the firing of rifles by our sentries to scare away thieves. In the morning my thermometer stood at 25 degrees Fahrenheit.

These grass lands in summer are veritable bogs. The water-soaked ground reminded me much of some of the summit bogs in the Hawaiian Islands.

At lunch time we let our laden yaks loose to graze. The horses were hobbled with hair ropes, one front leg tied to one hind leg. If ever a man should lose his horse in that wide, open country it might be gone for good, as lassos are unknown.

Near us was an abandoned nomad camp where the Moslems had done their worst, killing hundreds. Now not a soul was visible in the whole wild, dreary region of great bogs and streams of quicksand.

WATCHED BY ROBBER TRIBES

One of my boys was thrown by his horse. It galloped away, empty stirrups flying. Before we could catch it ten armed nomad robbers rushed out from hiding, encircled the horse and drove it off. This made me realize how the Amchok and perhaps other robber tribes were watching us.

For some days we continued over dreary snow-covered or water-soaked land, dark under low-hanging clouds.

The Sokwo Ariks proved a surly escort. One villain, with nose and lips split from many battles, threatened me with his spear simply because I urged him to protect his loads with the usual felt covers.

Crossing one of the divides between Labrang and the Yellow River was a physical ordeal. A 50-mile gale blew powdery snow over the ridges and whirlwinds sent white columns spinning high in air. Our figures became hazy white outlines in the blinding storm. With numb fingers I took photographs of the panting yaks floundering like huge snowplows through the pass. At the summit, 13,000 feet up, the wind nearly blew us from our horses. I felt my cheeks freezing.

Descending, we saw in a valley at our right a deserted camp of the nomads. There were old mud stoves and so-called sacrificial altars made of square blocks of yak dung piled about three feet high. Here they burned their sacred offerings of juniper twigs. We paused a while and our yaks pushed away the snow with their noses in a search for bits of grass.

Though the wind still blew, it was now dry, for it came off the Gobi. Crossing on over the Tek Gar Tang plain, we came down to the camp of the Sokwo Ariks on the Mamo Zhung, at an elevation of 11,500 feet. Although they are Tibetans, these tribesmen live in Mongol felt yurts instead of yak-hair tents. Because of their fierce dogs, which attack all strangers, we camped a little below them.

NOMADS LAUGH AT OPERATIC SONGS

We rested here a day and obtained fresh yaks to take us on to Dzangar, a monastery in a ravine not far from the gorges of the Yellow River. It was to Dzangar only that the Sokwo men had agreed to escort us.

The valley about our Mamo Zhung camp fairly swarmed with wild fowl, and I feasted. This amazed the nomads, who consider fowl and eggs unclean. Here again I set up my phonograph. The men roared with laughter at the pathetic songs from "La Bohème" and "Pagliacci." Sitting about, listening to the music, they smoked, lighting their pipes with smoldering yak dung. I bought fuel here, paying for it with needles and thread.

With fresh yaks we resumed our march, going into the Htse Chu Valley. The river has its source not far from the Yellow River. It flows east, bends sharply north, then south and southwest into the Yellow. We forded it at an elevation of 11,250 feet, at the same place where the German traveler, Futterer, coming from the north, crossed it some years ago. In fact, it was Futterer who put the Htse Chu on the map. Later he was robbed by nomads and arrived half-naked at Taochow. On this river we found many ducks and even sea gulls, which apparently summer on the waters of the Koko Nor.

THE CHIEF LIVING BUDDHA OF RADJA LAMASERY

He is considered the incarnation of the mother of Tsongkapa, the founder of the Yellow Reformed Sect of Buddhists, who are called the *Gelugpa*, or Followers of Virtue.

West by southwest from here I saw a conspicuous range with five peaks, the two central peaks being very prominent. I estimated this range to be about 16,000 feet high. Natives call it the Aric Dzo Ngon Ma.

A TIBETAN TEA PARTY

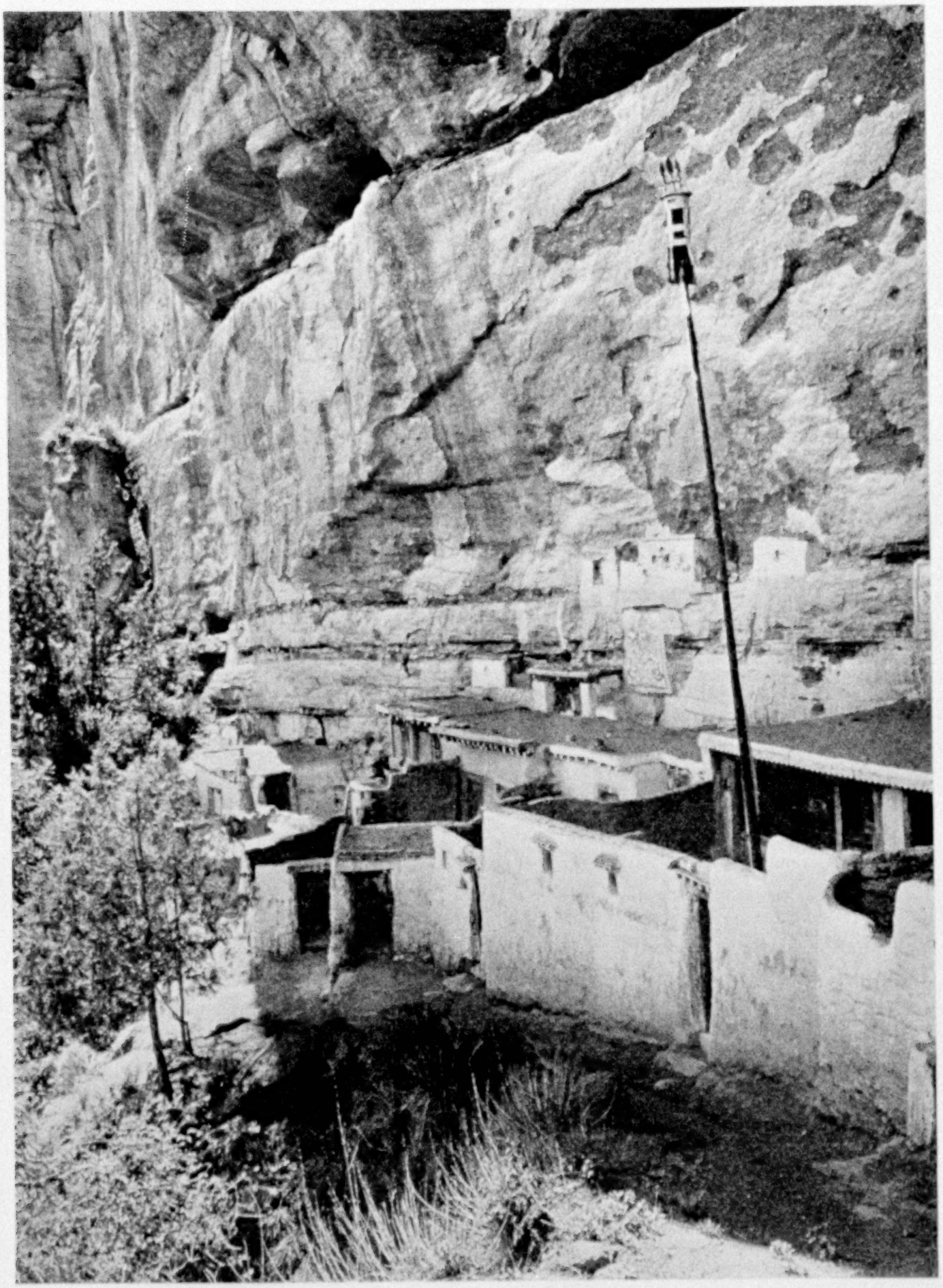
Camping next on the Chonakh River, a tributary of the Htse Chu, I heard of an 81-year-old Buddha living near by in a yurt. It was our policy always in this land, where travelers are regarded with suspicion, to make friends as we went. So I called on the old Buddha and presented him with pictures of the Dalai and Panchen Lamas. Then we went, as is the custom there, to take tea with his steward. This sounds quite formal, like polite life in England or America, but a Tibetan tea party is, to say the least, a gastronomic endurance test which no squeamish soul could survive.

In the steward's big tent a mud stove was roaring. From curiosity, many nomads with their wives and children followed us as we went in. They were husky, well-built people. In this raw land only the fittest survive.

Soon an old woman brought out some bowls from a pile of sheep manure, which served for fuel as well as a sideboard. She took some ground-up sheep dung in her hand and scoured the dirty bowls; then she polished them with a filthy rag which hung to her girdle and dragged on the filthier ground when she walked. With her dirt-incrusted hands she poured tea into these bowls and they were passed around. I set down these disagreeable facts only to show in what squalor these nomad Tibetans survive.

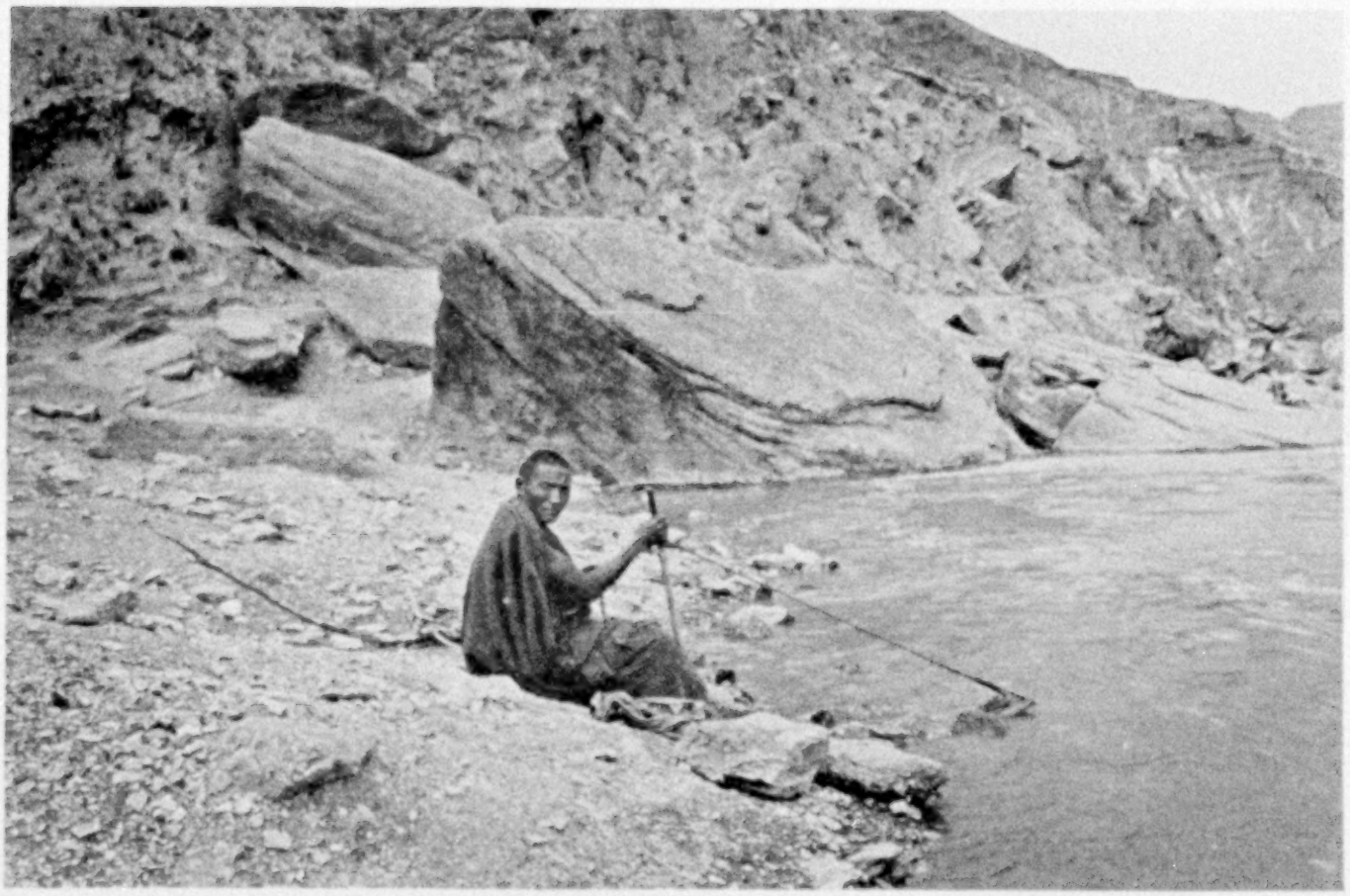
A wooden box was now set before us. In it lay dirty lumps of yak butter, covered with old dung dust and other unwholesome things. From this box the fingers of many a nomad had dug before me, and I could see the grooves left in the unpalatable mass by their finger nails.

In another compartment of the box was roasted barley flour, or tsamba, the staple food of the Tibetans. I shrank from either tea or food, but I could not offend



HERMIT QUARTERS OF THE MONKS OF RADJA MONASTERY

The religious recluses subsist on barley flour in winter and on boiled nettles in summer. Their cells are under the conglomerate cliffs back of Radja Monastery, at an elevation of 10,700 feet (see, also, illustration, page 148, and text, page 160).



A LAMA OF RADJA MONASTERY PRINTS BUDDHAS IN THE WATERS OF THE YELLOW RIVER

On the undersurface of a board this devout man has fastened five brass molds with rows of Buddhas in bas-relief, such as are used for making sacred mud bricks. By pulling the board out and letting it sink again, he was "printing" Buddhas in the water, thus acquiring merit (see, also, illustration, opposite page, and text, page 162).

these simple people, whose impulses were hospitable; so I whistled up courage enough to raise the tea bowl to my lips and take one tiny sip. Fortunately, the old Buddha at that moment sent word that he was ready to have his picture taken, and I had an excuse to leave the tea party without being rude.

We were glad when, after two more days of riding over a monotonous, rolling grass country, we came to a valley called Gan Mar. Through it a stream flows southeast. Wolves ran along parallel to our track at a safe distance, or sat up on the ridges and watched us as we passed. Herds of antelope appeared, too.

Farther on, many black Tibetan tents of the Tsokhar people dotted the valley. The weather here was most fickle. Nowhere have I ever observed such quick changes. As we passed the Tsokhar tents, the air was balmy, almost sultry. Then suddenly a cold blast hit us and hard snow pellets rattled on our coats. In an hour, it was warm again. That night we camped at 12,100 feet, on the banks of the Runa.

Beautifully colored partridges and many rabbits and marmots flew or scampered up the ravines for cover next day, as we crossed the high Nyinser Pass. Now the grass lands were behind us; we were definitely in the mountain regions. Rhododendron scrub covered the slopes of ravines and gorges.

MARMOTS WHISTLE AT THE EXPEDITION'S DOG

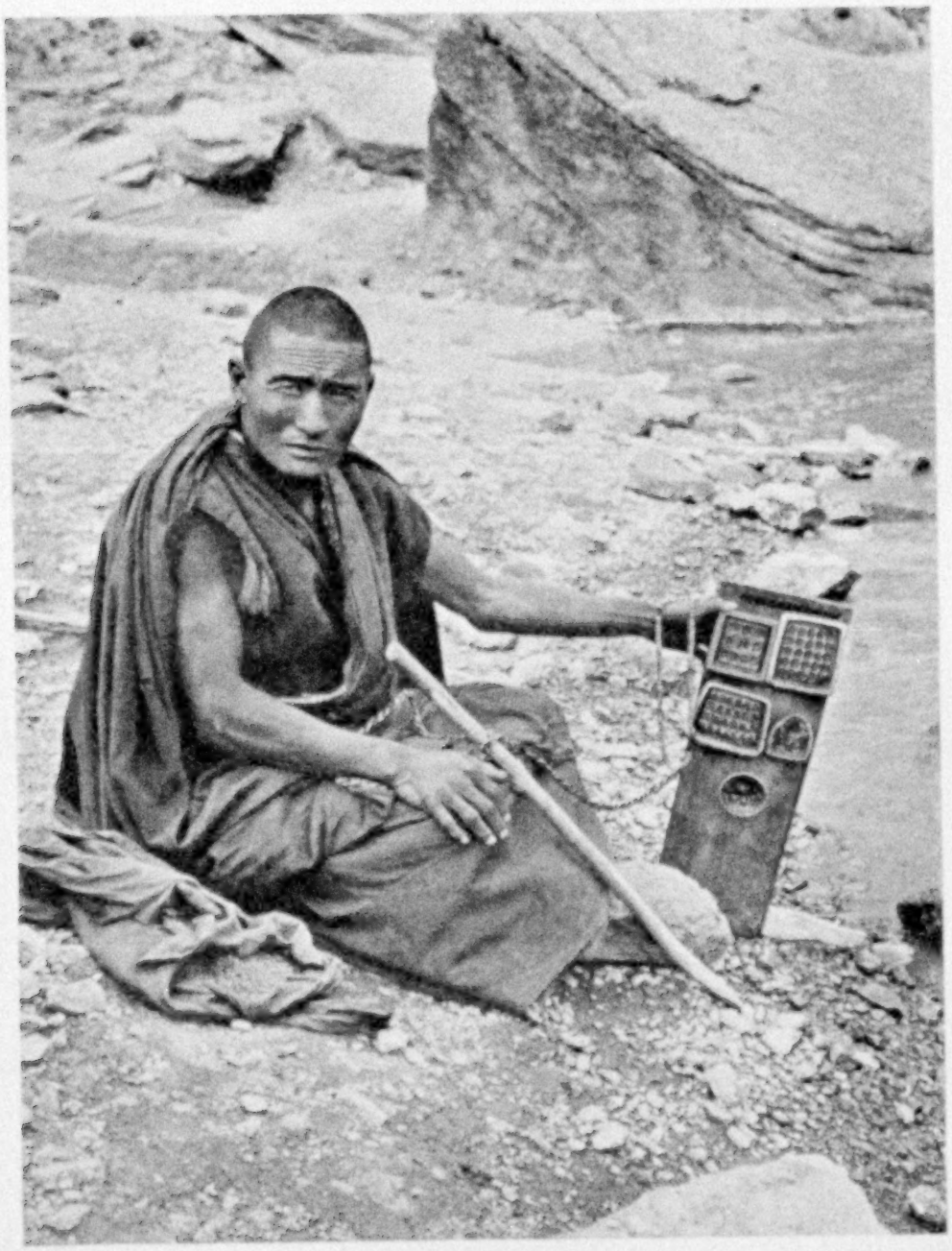
Our dog chased marmots that day until ready to drop from exhaustion. These creatures, which resemble prairie dogs, would sit erect in front of their burrows and whistle at him. Those near their holes easily escaped him by ducking in; but if they were foolish enough to whistle while away from home on a forage, the dog nabbed them. Usually he was victorious; but now and then he retreated with a howl of pain and disgust, as one of the

agile rodents valiantly gave battle and bit him on the lips or nose.

Scores of curious lamas sat on the flat roofs of Dzangar to watch us as we filed in and unloaded our yaks.

Here, having fulfilled their contract, our unruly nomad escort left us. They quit without a word of farewell or the slightest sign of interest in me. Having been paid in advance, they simply dumped all my belongings into the manure that covered the compound and walked off. But I was equally glad to be rid of them.

Next day, while fresh yaks and guides were being obtained, I went south five miles to see the Yellow River. My trail ran down the Gokhub Valley, then over a ridge to another ravine. Down both flow streams which unite and empty in the Yellow. From a high bluff near their confluence I beheld the Yellow River.



BRASS MOLDS USED IN "PRINTING" BUDDHAS IN THE YELLOW RIVER

In the cloth beside him is barley, of which a handful was thrown into the river as an offering to imaginary Buddhas, which he "prints" on the face of the waters (see illustration, opposite page).

THE WHITE MAN'S FIRST VIEW OF THE YELLOW RIVER GORGES

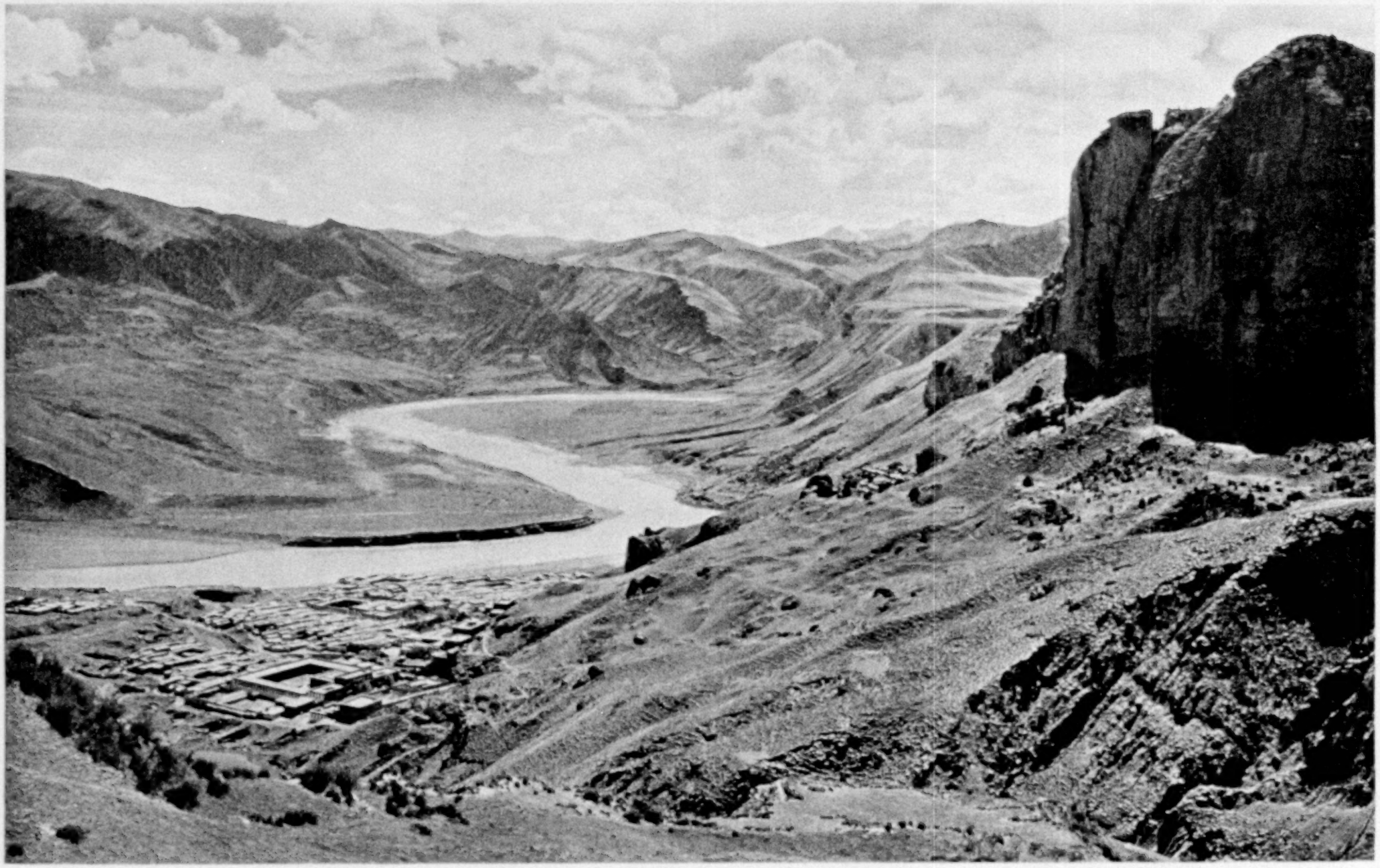
No other white man, since time began, ever stood here and beheld these deep gorges of the Yellow River.

Seven hundred feet below the bluff on which I stood flowed the Yellow River, 10,200 feet above the sea. Spruces, birches, and willows clung to the walls of the gorges.

The only way into the Yellow River gorge at this point is through a narrow valley called the Large Gate. We went down to it. Past its mouth roars the main channel of the great river, forming here a terrific whirlpool.

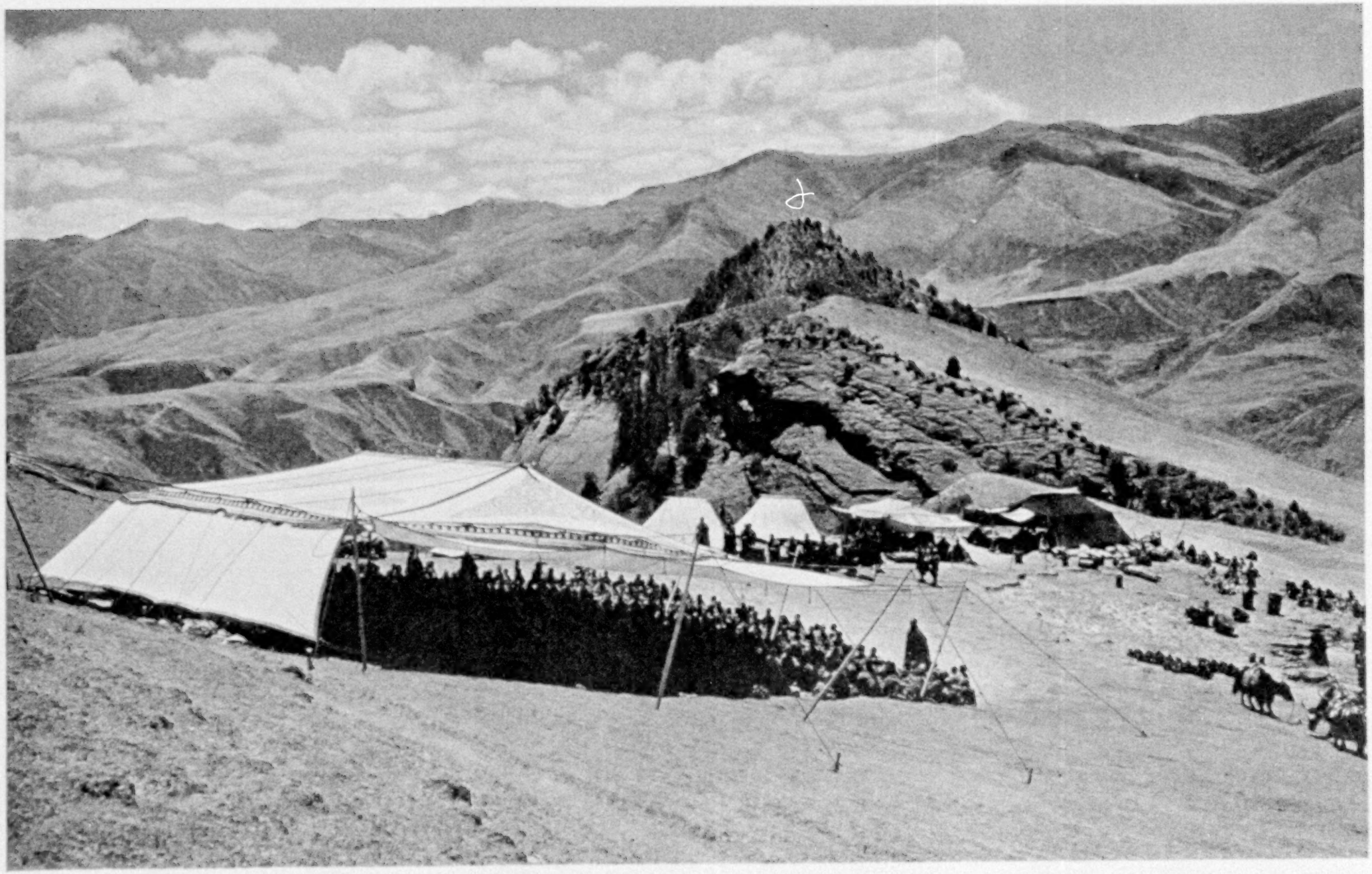
On the walls of the gorge grow dense groves of spruce. I asked the guide to cut the limbs from the trunk of one, so that I might make a close-up picture. But he objected, saying the mountain god of the place would punish us, for once before men had cut trees here, blood had flowed from the stumps and two Tibetans had been crushed to death by the falling trunks. Plainly, said the Tibetan, the god was displeased.

Dzangar shelters 500 lamas and 15 Living Buddhas. The only object of interest



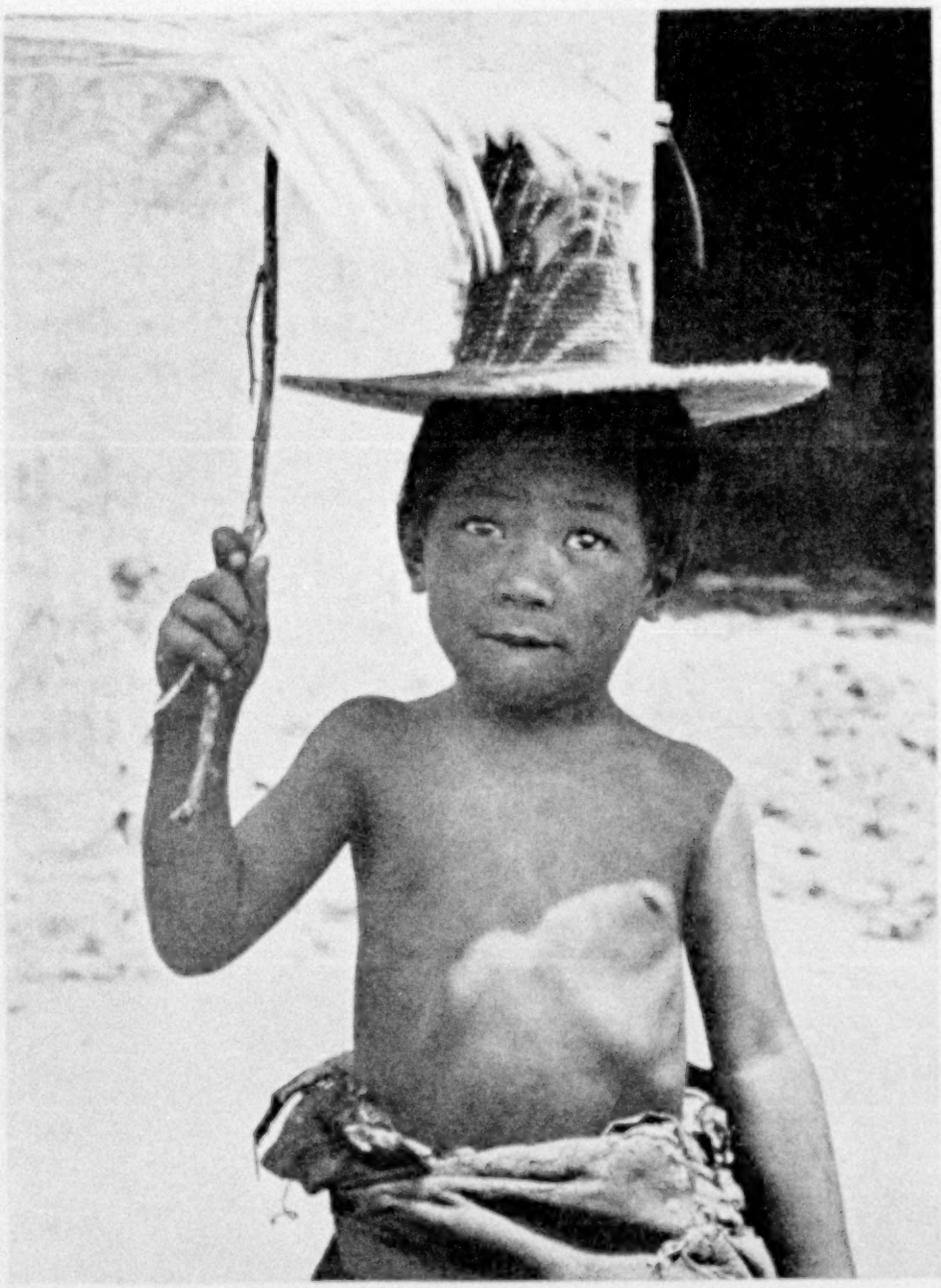
RADJA LAMASERY, HUDDLED BESIDE THE UPPER REACHES OF THE YELLOW RIVER IN TIBET

The author's compound can be seen at the extreme left, separated from the monastery by a gully.



MONKS CELEBRATING THE FESTIVAL OF THE MOUNTAIN GOD, AMNYI CHUNGUN

On the 11th day of the fourth moon prayers to this patron of Radja are held on the lofty slopes back of the monastery. In the tent more than 350 monks chant to Amnyi Chungun (see, also, illustration, page 150, and text, page 162).



A NGOLOK IMP OF RADJA

With improvised parasol he stalked about the lamasery courtyard.

to me in the dilapidated lamasery was a big painting of the god Amnyi Machen.

With some cotton cloth as "money," I hired a runner to go on to Radja and announce our coming. Then our new guides came with 60 fresh yaks and drew lots for our different pieces of baggage, so there would be no row as to who should carry the heaviest.

A BIT OF COLORADO IN THE GREAT GOLD VALLEY

An extraordinary region opened before us when we reached Ser Chen, or Great Gold Valley, on our way to Radja. Weird sandstone cliffs, castles, and wind-hewn rock towers, where eagles nested, rose about us, and fragrant junipers clung to every crack and ledge. It was not unlike certain Colorado scenery.

After establishing camp, I went down the Great Gold Valley to the point where, narrowing down to a rocky gateway, the Ser Chen joins the Yellow River. Here I climbed up beside the stone gateway and, to my amazement, I saw the mighty stream, some 200 feet below, confined to a gorge no more than 80 yards wide.

Here again my American interpreter and I were the first of our race to look down upon this great river imprisoned in this deep gorge, for it may be said that the whole course of the Yellow River from south of Dzangar to and including the gorges north of Radja were absolutely unexplored and never before had been visited by white men.

It gave me a peculiar feeling in this lonely wilderness to be the first to look upon this mighty river flowing through hitherto unknown gorges. The ravine was choked with fallen timber, roots, tangled underbrush, and broken rocks which had fallen from the heights.

The gorges of the Yellow River at the mouth of Ser Chen Valley are not less than 3,000 feet in depth, but the high peaks forming the gorge were not visible from the point where we stood.

To celebrate this first view of these gorges we killed two eagles as natural-history specimens. They are now in the Museum at Harvard.

Going back to camp, we explored the Gold Valley upstream, or north. It changes to a deep gorge with sheer 1,000-

foot-high sandstone walls. Its floor is densely wooded with enormous century-old junipers. Into the walls of the gorge penetrate deep caves, from whose ceilings hang giant icicles like stalactites. Wild it all is, yet uninhabited; hence peaceful.

Flocks of Tibetan eared pheasants whirred from our path next day, as we marched on over recurring ridges and valleys toward Radja. Our trail at times ran along the rocky banks of the Yellow River. Once we startled a flock of wild blue sheep, with great curved horns. Up a dizzy chasm they fled, making spectacular and unbelievable leaps from one rock shelf to the next. Still talking about the sheep, we rode around a sharp point and there, in the valley of the Yellow River, lay Radja, our base from now on.

THE YELLOW RIVER GORGE, UPSTREAM FROM THE EDGE OF DAKHSO CANYON

Between these lofty walls, three days' journey northwest of Radja, the mighty stream flows at an elevation of 11,000 feet (see, also, p. 161).

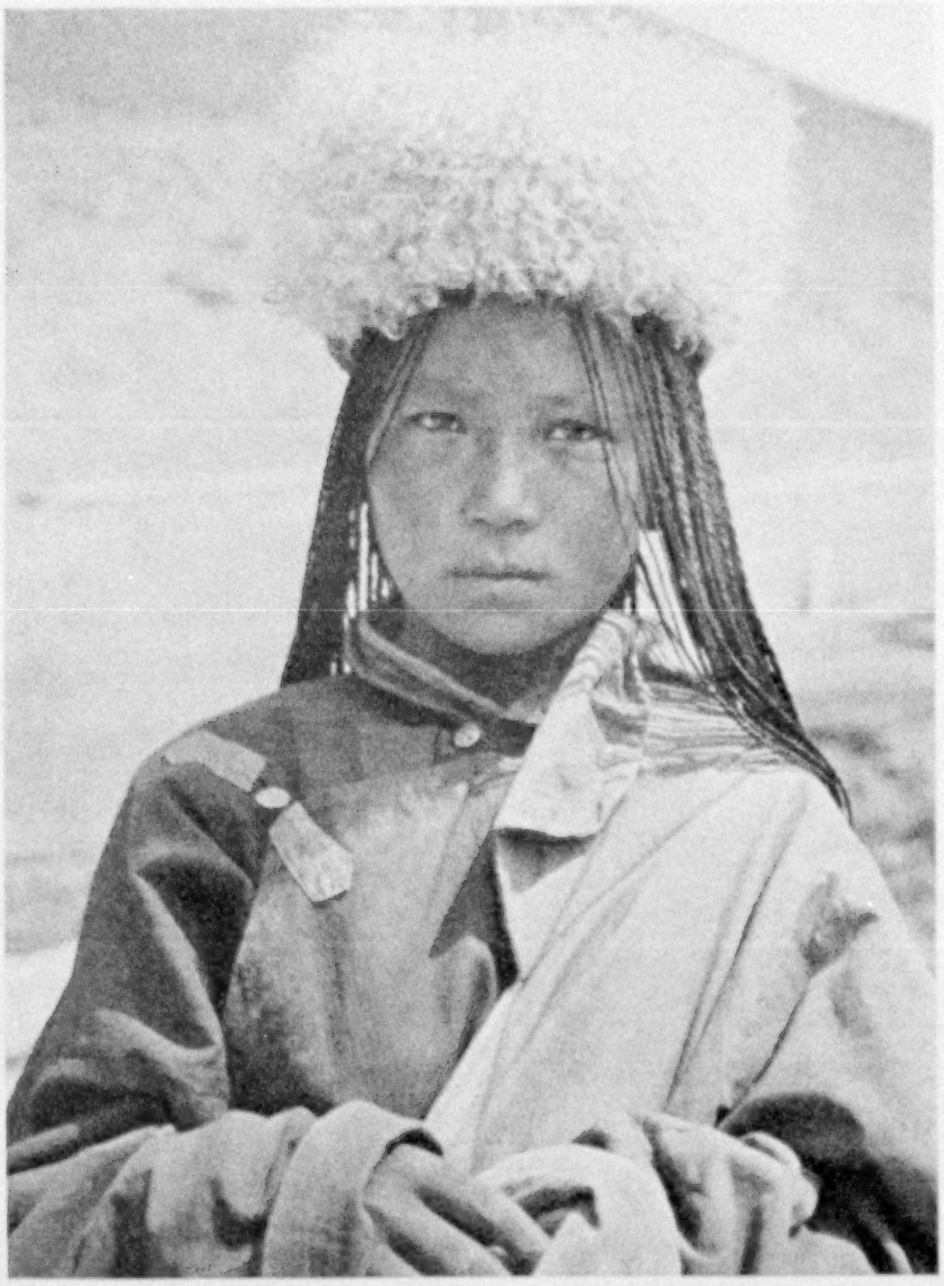
From my quarters in the Radja lamasery, I could see the Yellow River, and on to the west the wooded slope of a mountain, and a trail leading into the land of the Ngoloks.

THE RADJA BUDDHA ENJOYS A TIMEPIECE SYMPHONY

I called on the local Buddha, of course. Without the aid of these holy men, no intruder from the outside world could last long among these fanatics. His reception room was a curiosity. From floor to ceiling, clocks and watches of every description and size were ticking away, each keeping its own time regardless of the actual hour. Clocks struck at various intervals—some in unison, others in quick succession. An old-style Swiss cuckoo added its raucous squawks to the chronometric cacophony. I gave him one more watch; also, a pair of snow glasses and an American 20-dollar goldpiece.

My interpreter explained the objects of our march and asked our host to help us. The Buddha said little himself, but instructed his steward to advise us.

The Rimong chief, most powerful of the Ngoloks, would probably rob and murder us, predicted the steward. Only recently this wild tribe had even robbed a Living Buddha, taking from him 40 horses and 400 sheep, as his party went over one of the Ngolok trails.



A YOUNG WOMAN OF THE LHARDI TRIBE PHOTOGRAPHED IN LABRANG

She wears a lambskin cap and her hair is braided in 108 pigtails, a holy number (see, also, pages 140 and 179).

My three letters of introduction to the Ngolok chiefs, given me at Labrang, were of no use, in the local Buddha's opinion. Better not send them at all. Our best plan was to leave our slow yaks at Radja, get on our horses, and make a quick dash for the Amnyi Machen—that is, accomplish our aim before the Ngoloks became aware of our plans.

I demurred. Such a dash would leave me no chance to explore or make pictures. After more argument the Buddha finally changed his mind and said he would send my messages to the Ngolok chiefs, advising them of my approach. At first, every man who was asked to go as a messenger with our letters declined the job. In the end, the Buddha found a lama, either more courageous or more foolhardy than the rest, who was willing to act.

Besides our letters, we also sent presents to the chiefs. To get an answer, we figured, would require about two weeks—a foolish hope, we were to learn.

While waiting for an answer from the Ngolok chiefs I had an opportunity to study Radja and the gorges of the Yellow River to the north.

Few in the outside world know that Radja Gomba exists. Life here is unbelievably crude. On the hillside back of the lamasery, for example, are the huts of many hermit lamas, some even from the wild Ngoloks. Ceilings of these huts are so low that a man cannot stand erect in them; yet here these austere creatures spend their years. Others live in caves in the near-by cliffs. Prayer, meditation, and abstinence are their lot. They certainly *do* abstain! In winter they live on barley flour; in summer their chief diet seems to be stewed nettles (see pages 148, 153).

"THE LIVING BUDDHA BUSINESS IS A POLITICAL SYSTEM"

The Radja Lamasery's drinking water is carried up from the river in huge wooden buckets. I rigged up a filter from kerosene tins to get part of the mud out of the yellow water, which was as thick as pea soup. This amused the lamas and stimulated the loquacity of our good-na-

THE AUTHOR'S CAMP IN DAKHSO CANYON

Set among spruce and willow and viewed from a trail leading to Ngarkigongma (a bluff overlooking the Yellow River gorges), this camp stands at 10,146 feet above sea level. Dense woods cling to the northern slopes, but on southern exposures slopes are bare, owing to earlier melting of snows.

tured old water-carrier. Not being a native of the place, he commented freely on the habits of the lamas at Radja.

The Living Buddha business, he said, was a political or diplomatic system and always worked out for the good of the rich and influential. The local Buddha was very rich; so was his steward; and when "reincarnations" occurred, it seemed to him that this "miracle" always happened just as it might have been desired by the chief Buddha. For example, when the daughter of a powerful chief died, she was soon afterward incarnated in the person of a small boy, a nephew of the Buddha's steward—a business and political arrangement agreeable to all concerned! When one of the minor Buddhas of Radja died he, too, was happily, conveniently, and quickly reincarnated, this time in the person of the steward's brother!

I smiled and asked the water-carrier how it happened that none of his children was the reincarnation of some departed Buddha. With a twinkle in his eye, he remarked that it was because the sum of all his worldly goods was two goats.

There is no such thing as a jail in Radja, we were told. Lamas who steal, or break other important laws, are tied

THE BUTSANG NGOLOK CHIEF AND HIS WIFE

The daughter of the King of the Ngawa tribe appears in all her finery.

up and beaten; then, with duncecaps on their heads and strings of bones around their necks, and brooms in their girdles, they are driven from the monastery.

PRINTING IMAGES ON WATER

Walking along the river one day, I found a lama who seemed to be playing in the water. He had a board about two feet long with a string tied to it. He would let the board float away a bit, then pull it back. Two hours later when I returned he was still there, playing with that board. On the underside were five brass molds, such as are used in making mud bricks, decorated with numerous images of the Buddha. On investigation I found that he was printing images of the Buddha on the passing river. By doing so, he acquired merit. He occupied himself in this way for hours (see pp. 154-5).

I was invited by the chief Buddha to a picnic to celebrate the feast of Amnyi Chungun, the mountain god of Radja. My host rode ahead on a horse, followed by about five hundred lamas. They went up on the mountain, set up their tents, and improvised an altar whereon offerings of juniper twigs were burnt. Between prayers they ate all the usual unpalatable Tibetan delicacies and drank their strong tea from dirty cups.

After final prayers the Buddha left, riding a beautiful horse with its saddlecloth and trappings of gold brocade and sheltered by a big gilded umbrella. When he was safely out of sight, the lamas played hilarious games and frolicked to their hearts' content in a very childish manner.

Back in Radja a fair was under way. Many Ngoloks from the Hdzanggur tribe were camped on the Yellow River opposite the lamasery. Here a ferry of inflated goatskins supporting a raft of poles was in operation. These skins soon went flat. After each trip the Tibetans had to blow up each skin—excellent exercise for the lungs. As many as 12 people would ride on one of these flimsy rafts. Horses and cattle, of course, had to swim, and often, as I later learned to my sorrow, working animals are drowned in this swift stream (see, also, page 164).

I crossed over to the Ngolok camp to see what these almost unknown wild people were like. Though very suspicious of us,

they showed the greatest curiosity about our appearance and clothing. My interpreter heard one of them say: "Till now we have never seen men like you. What are you doing here?"

POCKETS AND BUTTONS AMAZE THE NGOLOKS

They formed a circle about me, feeling my clothes. My pockets in particular amused them. "They are casings for the hands," they said. My shoes also aroused admiration and the Ngoloks wondered how so many stitches could be taken in leather. Buttons and buttonholes amused them. They followed me about, shaking their heads in bewilderment.

I pointed my camera at them and tried to explain its use, but they ran away. I did manage to photograph one wild fellow, however. His abdomen was covered with straight scars, made when he had held burning rags against his body to cure his stomach ache. These scars were so evenly placed that they looked like tattoo-marks. Other Ngoloks had scars on wrists and hands, marks of fiery ordeals to cure rheumatism (see page 166).

THE WIFE OF A BUTSANG NGOLOK CHIEF WEARS A GOWN OF GORGEOUS DECORATION

Suspended from her hair is a long strip of red cloth, to which are fastened large opaque, canary-yellow amber beads and long pieces of red coral. Immediately below her hair are rows of turquoise and silver buttons. From each side of her waist hang leather strips decorated with silver and terminating in disks of ivory. The amber is bought at the rate of ten ounces of silver for one ounce of amber, which comes from the Baïkal region, in Siberia.

After our arrival at Radja two Moslem traders appeared and bartered for 88 yaks from the Ngoloks. Radja ferrymen, with certain confederates, tried to steal these yaks from the traders. During the night, at their third attempt, the traders fired and killed one of the would-be thieves, then fled across the river to the lamasery.

Next morning the river bank opposite us looked like a war camp. All the friends and kin of the dead tribesman had gathered to avenge his death. Their first act was to drive away the 88 yaks belonging to the Moslem traders. Others got ready to cross the river to catch the two now frightened traders, who, fearing for their lives, sent over some money, horses, and a rifle as a peace offering to the family of the man they had killed.

SKIN RAFTS ON THE YELLOW RIVER AT RADJA

Such craft consist of from six to twelve inflated goat or sheepskins tied to a few sticks. To cross the swiftly flowing river on one of these rafts is a rather precarious undertaking. Here the author's party has just been ferried across on two rafts tied together (see page 162).

Apparently satisfied with this easy haul of yaks, money, and horses, the tribesmen shouldered their dead comrade and made off.

Although the two Moslems appealed to the chief Buddha, he was powerless. The guilty clan paid not the slightest attention to him; in fact, a few nights later, they stole some of his owr horses and sheep.

We heard that one Ngolok raiding party, the winter before our arrival, had crossed the ice on the frozen river, robbed and looted at will, and returned unmolested to its camp.

THE BUDDHA SENDS OUT A "CURSING EXPEDITION"

The Ngoloks are no respecters of persons. One day, while awaiting answers from our messages to them, the Buddha suddenly informed me that we should start at once on our final dash. News had just reached him that a member of his lamasery, returning from the Ngoloks, had been robbed and killed. In punishment the lama council was sending a "cursing expedition." Sixty monks were to go to the tribe that had done the killing and put the monastery's official curse on it. By joining this cursing party, the Buddha believed I could easily get into the forbidden country.

I had no qualms about going on a cursing party, but I could not get my yaks ready in time, so I was left behind. Later, I learned the cursees met the cursers halfway and paid indemnity to escape the threatened evil spell. Fearless as the Ngoloks are, they are also very superstitious.

While still waiting for an answer to my letter to the chiefs, I went on a side trip to explore the gorges of the Yellow River. With an old guide from the Gartse tribe and 15 yaks, I followed a trail which crossed at right angles many deep ravines coming down to the Yellow River from its north bank. An odd physiographic feature of these ravines and lateral valleys is that their formation seems reversed. Toward their heads they are often a mile wide and are bare of vegetation;

TRAVELING HDZANGGUR NGOLOKS, ON THE WESTERN BANK OF THE YELLOW RIVER

Back of the skin bags are two rifles, with the indispensable forks on which the weapons are rested when discharged (see, also, illustration, page 142).

farther downstream they merge into grass lands, and at their mouths, where they debouch into the Yellow River, they are merely rocky gates a few yards wide.

THROUGH AN EMPTY WORLD

Uphill and down, through canyons and over passes with odd, gurgling names, we pushed our toiling way through an empty world. Not a human being appeared anywhere in that forsaken region.

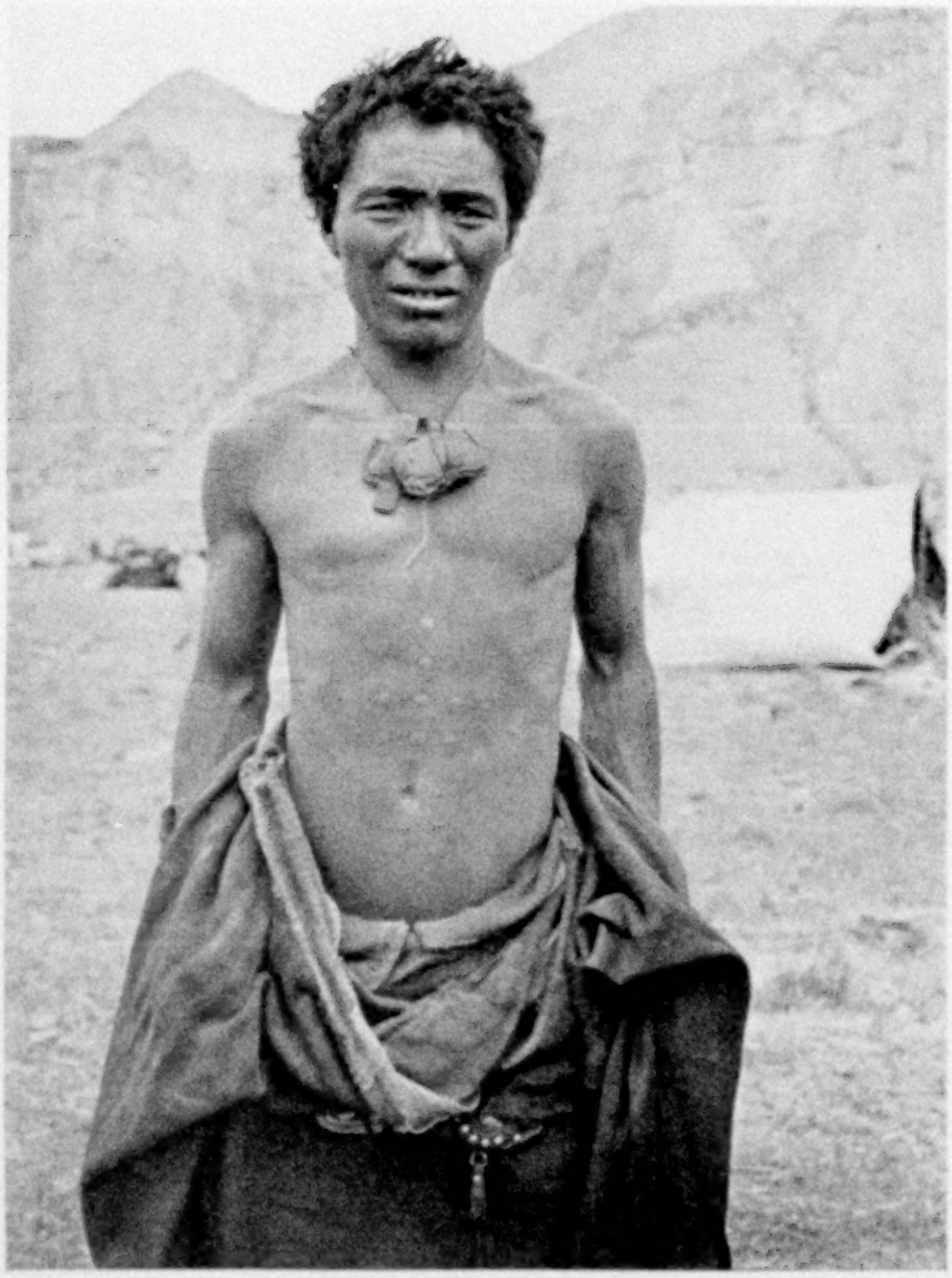
Then, atop the Mokhur Nira (Pass), at an elevation of 12,800 feet, I got my first view of the Amnyi Machen. All I saw, however, was one dome-shaped mass of purest white. Far off to the south a long snow-covered range extended from east to west. South of it lies Ngolok land.

From the Mokhur Nira we climbed a peak to the right of the pass, to an elevation of 13,220 feet, from which we gained a much better view of the Amnyi Machen. To the north its peaks decrease in height more rapidly than to the south, the whole range appearing as one large mountain mass. It does not extend down the knee of the Yellow River, as most maps indicate, but is a single mountain mass.

There are several lower ranges east of the Amnyi Machen more or less parallel to it. From the Mokhur Pass we now descended into a narrow, rhododendron-covered, swampy valley which led into a canyon, where we spent the night at an elevation of more than 11,000 feet. The rock, as in most other places in the Yellow River gorges, is shale and schist.

From here we climbed to a 11,700-foot bluff and took photographs west-northwest of the Yellow River, which flowed about 2,000 feet below in a terrific gorge, with vertical walls furrowed by landslides. Then we descended directly through forest into Dakhso Canyon, a walk of more than two days. At the very foot of the trail is a small grassy space, the only available camping ground. We spent four days in Dakhso Canyon, exploring the forests by following up the stream bed over bowlders and fallen logs (see pages 159, 161).

On June 2, a morning with a deep blue sky and cirrus clouds, we climbed to a



A NGOLOK OF THE HDZANGGUR TRIBE IN TIBET

He lives about three days' journey west of the Yellow River from Radja. The tattoolike marks on his abdomen are not there for ornament, but were burnt in with flaming bits of rags to cure indigestion (see text, page 163). Around his neck he wears charms.

high bluff, Ngarkigongma, which permitted a magnificent view of the Yellow River gorges. I took several photographs downstream, numerous rapids appearing in the distance. To the north the mountains became higher and the Yellow River gorges consequently deeper.

PRIMITIVE MAN'S CONCEPTION OF AIRPLANES

On the climb to the top of Ngarkigongma we took our nomad yak driver along. As we looked across the peaks and gorges, we remarked to him that with an airplane one could reach the Amnyi Machen during the time it would take him to drink a bowl of tea. Any other comparison, such as saying "in 10 or 20 minutes," would have been meaningless to him. He replied, "Yes, I have heard that in foreign countries people can get inside of an eagle and are thus able to fly." He seemed amazed when we told him a machine was used for flying. "But of course you use eagle feathers!" he insisted. It is difficult to explain anything to such simple people, whose only means of transport is the yak, which travels at two miles an hour.

From Dakhso we returned to Radja by another route, through absolute wilderness, primeval forests, and terrific canyons hitherto untrodden by the foot of white men.

Still without word from the Ngolok chiefs, we went on an 18-day trip to explore the Jupar Range. Here, too, we were undoubtedly the first of our race to plant foot. And again, from this region, we could see the towering Amnyi Machen.

Disappointment was ours on our return to Radja. Neither the escorts nor the yaks we had bargained for were ready. In fact, we were bluntly told nobody would go with us. A warning had come from the wild Ngoloks that no one should aid us to get into their country, and the people were afraid.

In despair, I threatened the lamasery people. Unless we were immediately provided with escort and animals I would ask aid of the Sining Moslems, whom they

so much feared. This brought the lama council quickly to time.

We could cross the Yellow River at Radja, they advised; go first to the camps of the Tawu clan, and from there it would be only one day to Amnyi Machen. To be able to move quickly in case of attack, we decided to use only horses and take an irreducible minimum of food, tents, and clothes.

The chief of the Radja council said he would send word at once to the Jazza clan's camp, west of the Yellow River, and I agreed to hire the male members of that clan to escort us to the mountain. The lamas, however, could not guarantee our safety, and should the Ngoloks or other robbers attack us they would not be responsible for our lives and property. To this I agreed. I had come to the conclusion that to work at the Amnyi Machen peacefully would be out of the question. It is feasible to get there, but to stay and work is another story. It would mean either keeping a large, well-armed party for one's protection or else depending upon the friendly coöperation of all the Ngoloks.

TWO NGOLOKS OF THE HDZANGGUR TRIBE AT RADJA

The man to the left is in the act of taking snuff, which consists mainly of the ashes of yak dung. In one hand he holds a snuffbox and snuff on the thumb of the other. Photographed in the Ngolok encampment, opposite Radja, on the west bank of the Yellow River, with part of Radja appearing in the background.

SPIES INFORM NGOLOKS OF THE EXPEDITION'S PLANS

In the meantime, while making preparation for the hazardous journey, some spies informed the Ngoloks of our plans. Most likely it was the ferrymen and the old water-carrier (see pages 160-1). His brother-in-law (a Butsang Ngolok chief) had already sworn that if ever we should come anywhere near his encampment it would be the end of us. The Radja lamas, too, had warned us not to go. They said the Hdzanggur Ngoloks were waiting for us in the Gur Zhung Valley. One tribesman, in fact, came boldly into our compound and in a bluffing voice said, "You had better not go, for all the Ngoloks are aroused and are awaiting you to rob and perhaps murder you."

Notwithstanding these threats, we laid our plans. The chief of the Jazza clan

A SEA OF MOUNTAINS CULMINATES IN THE PEAKS OF AMNYI MACHEN

A view of bare mountain regions, taken from Woti La (Pass), at an elevation of 14,680 feet. The author was on his way to the Jupar Range, eighteen days' journey from Radja, when this photograph was made.

THE BA VALLEY OF TIBET, FROM ITS SOUTHERN RIM IN THE BA PLAIN; ELEVATION, 10,400 FEET

The willow-lined Ba stream flows through eroded loess and gravel slopes. On the terraces in the valley (center and left) are the only Tibetan villages in this sea of grass. The inhabitants are called "the people living under the ground." The Jupar Range, with its bare southern slopes, is visible above the Ba Plain.

BACK FROM A SUCCESSFUL DUCK HUNT

Two of the author's happy Nashi boys enjoyed a short excursion into the Ba Valley, notorious for its robber tribe, the Shabrang.

came to discuss terms regarding our trip. We were to make a large encampment in three days, and there engage Kangsar Ngoloks to escort us farther. He also said if we did not stay too long at the Amnyi Machen there would probably be no danger.

July 11 was set for our departure. Gomba, the Jazza chief (see p. 172), came early, but on that morning we had an accident while crossing the Yellow River. One horse was drowned. I pretended to be discouraged and announced that I would either not go at all or else postpone the journey. I had, however, a plan to mislead everyone, even my own entourage. I told Gomba to come next day and bring what silver he had left from the amount advanced him, as I had decided to return to Labrang. Then we recrossed the Yellow River to Radja and announced that we would return to Labrang.

To give our plan the appearance of truth, I ostentatiously sent two men and our old yak driver to the Gartse tribe to engage cattle to take us to Labrang.

Early the next day Gomba came with 50 taels of silver, and bemoaned the fact that I had given up the journey to the mountain. But I took him aside and told him to keep the money and say nothing. "Fetch the rafts and load them with our belongings," I said. "This very day I shall follow you to your camp and on to the Amnyi Machen, as agreed."

The water-carrier, whom I suspected as a spy, we sent on an errand to the lamasery.

We took several horses instead of yaks and loaded them lightly, so as to make quick progress. All had assembled on the river bank. To expedite the crossing, Gomba's tribesmen took off their clothes and stuffed them into goatskins taken from the inflated rafts; then they fastened the skins around their bodies, while each drove a horse into the river and, taking hold of the horse's tail, swam across, or rather let the horse pull him to the other bank.

We assembled our loads and when all was ready followed downstream on the muddy bank to the little valley of Ulan. This we ascended. As we turned into the ravine I beheld an ominous black-blue sky

and knew that we were in for a terrific storm. Gomba suggested that we wait until it had passed; so I found shelter in a dry brook bed, under an overhanging ledge of rock. The storm broke, but soon we all went on in spite of rain, lightning, and deafening peals of thunder. The stream bed had become a red torrent, which we had to cross and recross many times, while the steep hillside had become unscalable red-clay mudslides.

Eventually we emerged from the storm at an 11,650-foot pass. From here we had a beautiful view westward over a vast rolling land. We descended into the Sher Lung Valley; thence to a stream which flows in a narrow canyon to the Yellow River. The water was a deep red, but the fording was not difficult. We continued up a lateral valley skirting small ravines, and, after crossing a steep spur, arrived at the encampment of the Jazza clan just in time to pitch our camp before dark.

THE YELLOW CHINESE POPPY OF THE TIBETAN HIGHLANDS

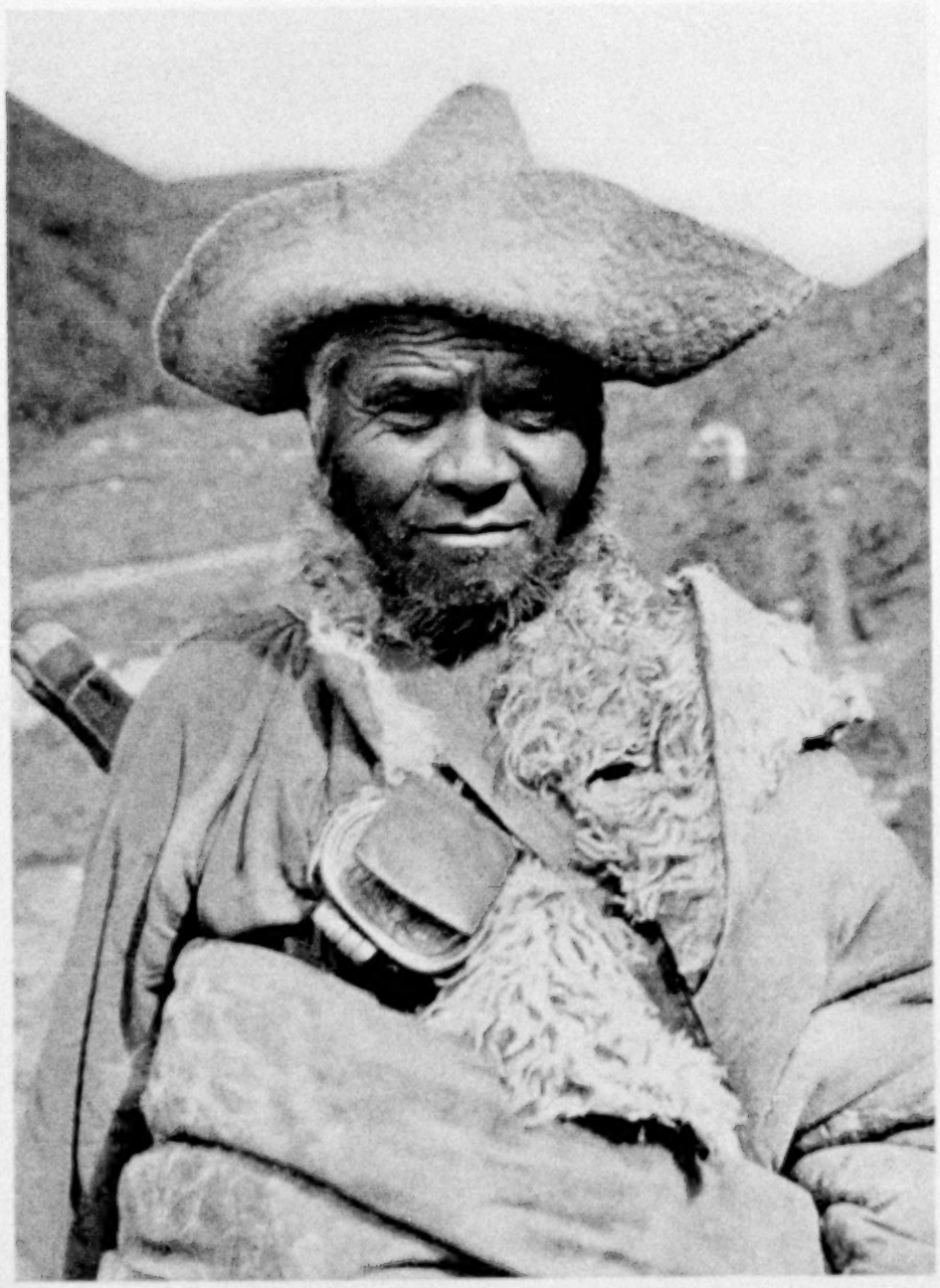
The flowers are often more than six inches across. This specimen of *Meconopsis integrifolia* was photographed in the upper Jupar Valley in July, at an elevation of 12,600 feet.

THE EXPEDITION GOES FORTH INTO THE UNKNOWN

This was the first time any white man had ever camped west of the Yellow River and east of the Amnyi Machen. We were in absolutely unknown territory, unknown from every standpoint. After a sleepless night, owing to the barking of the nomad dogs, we arose, got our escort together, and sallied forth.

Our first objective was Amnyi Druggu, a high mountain facing the snow peaks, from which vantage point we hoped to photograph the Amnyi Machen as a whole. But across the Gur Zhung Valley a still better view can be had than from Amnyi Druggu. The trail led southwest on the bare grassy slopes, with not a tree visible anywhere (see map, page 138).

To our right extended cliffs of purplish-red conglomerate, a continuation of the Radja cliffs, through which the Yellow River has cut its way. These cliffs culminate beyond the Jazza encampment in a high red bluff. This prominent feature of the landscape, crowned by juniper trees, is called Amnyi Geto, the mountain god of the Jazza clan. At its base, on the left



GOMBA, NICKNAMED DADDA, CHIEF OF THE JAZZA CLAN

His tribe braved the threats of the Ngoloks and, in spite of them, took the author's party across the Yellow River to the Amnyi Druggu. The felt hat he wears is typical of the Tibetans who live near Radja; even the lamas, when traveling, wear such hats, but in their case the felt is dyed yellow (see text, page 170).

of the trail, is an obo, a pile of sticks and rags and rocks. Here the clan burns its incense offering to Geto. The elevation at the obo is 11,800 feet.

We now went west, still over grassy hills, up and down, at an elevation of more than 12,000 feet; then northwest, leaving to our left a deep valley with sunken terraces, one above the other. Then we went down into Drukh Nang, or Dragon Valley, which leads to another pass, the Drukh Gi Nira, at an elevation of 14,250 feet. It is on the border of the Jazza territory. Ascent and descent were very difficult, because of the water-logged condition of the ground, which resembled one vast bog.

We were now in the territory of the Yonzhi tribe, which extends to the Cheb Chu and Yellow rivers. Poor as the region east of the Yellow River is in game (except for blue sheep, gazelles, and wolves), game to the west, in the Amnyi Machen mountain system, is most abundant. It is difficult to see what prevents these animals from migrating over the Yellow River to the east, when in winter that stream is one sheet of ice.

At the summit of the pass we espied three big sheep, with horns forming tremendous spirals, which did not extend laterally, but formed one huge frontal spiral reaching nearly to the ground. The nomads call these sheep *nyen*. They are undoubtedly related to the Ovis Poli. The Jazza people told us, and I merely repeat it without comment, that the old rams often die of starvation when their horns grow so big that the animals can no longer reach the grass.

The whole region between the Yellow River and Amnyi Machen is one great zoölogical garden. Wherever I looked I saw wild animals grazing contentedly. There were various deer, wapiti, and many other animals unknown to me.

In order not to meet too soon with the Yonzhi tribe, we decided to camp below the pass, in a small lateral valley, above juniper forest.

After a peaceful night we descended the Hcha Chen Valley. A few miles be-

low our camp it was filled with magnificent juniper forest. While I stopped to photograph, Gomba and my American interpreter went up a small valley to our right, where the Yonzhi chief had had his encampment. There was, however, no sign of any tent. Nomadlike, they had moved again.

The scenery became more and more beautiful as we descended. The little meadows, clearings in the juniper forest, were full of flowers—blue poppies, yellow primulas, and others—out in all their glory. Where the valley narrows into a defile, we found a trail leading through virgin juniper forest.

PRAYERS HUNG ON TREES

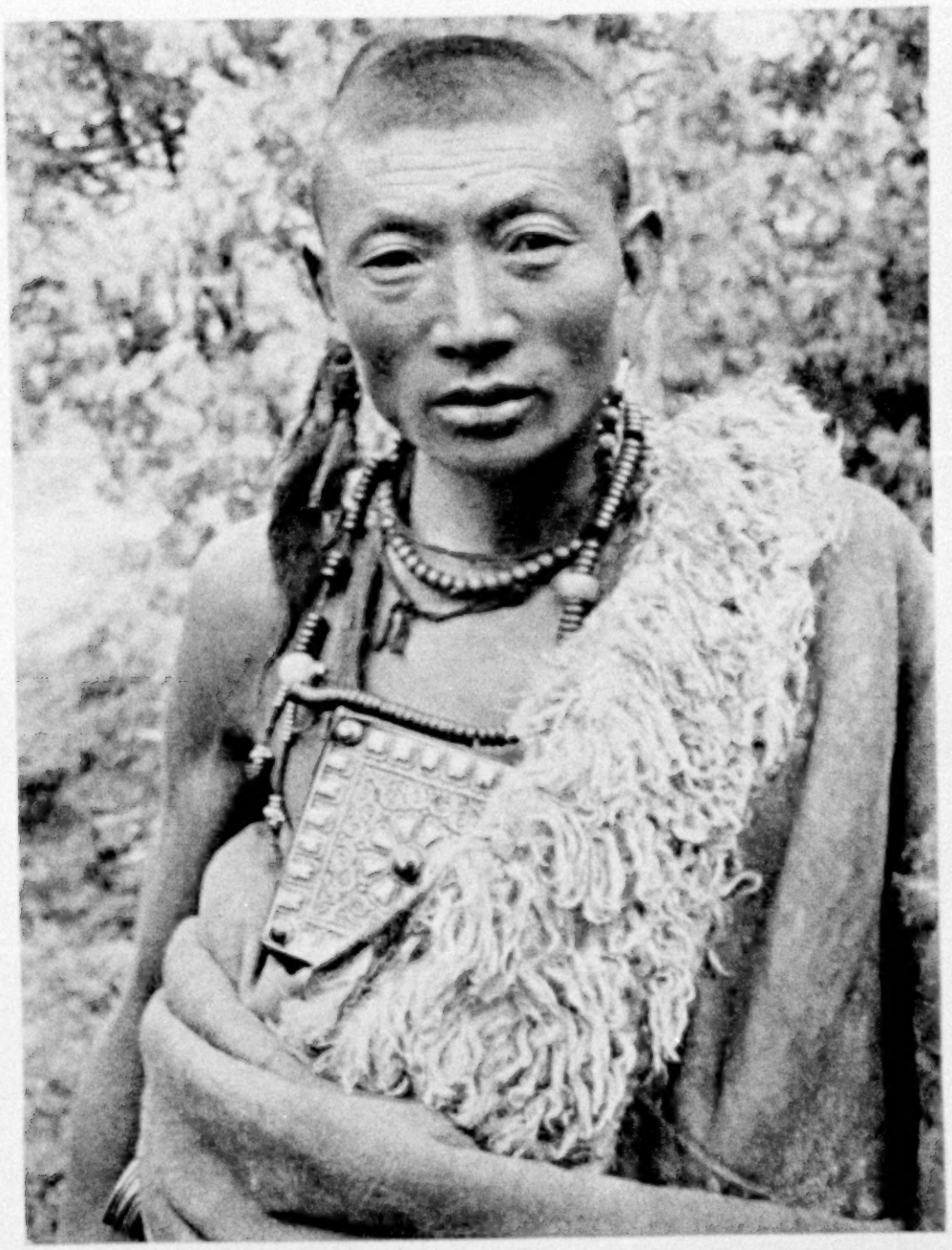
It was a glorious day. From the branches of trees there hung, suspended on yak-hair rope, many mutton shoulder blades inscribed with the sacred formula, "Om mani padme hum." These were hung so low that passers-by were bound to touch them and thus, by setting them in motion, say the prayers written on them (see page 175).

After crossing a wooded spur over a steep, hard trail, we descended into a lateral valley forested with spruce on the northern slopes and juniper on the southern. Here we found the tents of the Yonzhi tribe. The people were astonished at sight of our party. They joked with Gomba, and one asked, "Why this array of arms and force when visiting our territory?"

We continued up the valley to the very foot of Amnyi Druggu, the mountain god of the Yonzhi tribe. The last few tents we passed were cursed by some plague, the nomads said. The inmates lay dying outside, covered with yak-hair rugs.

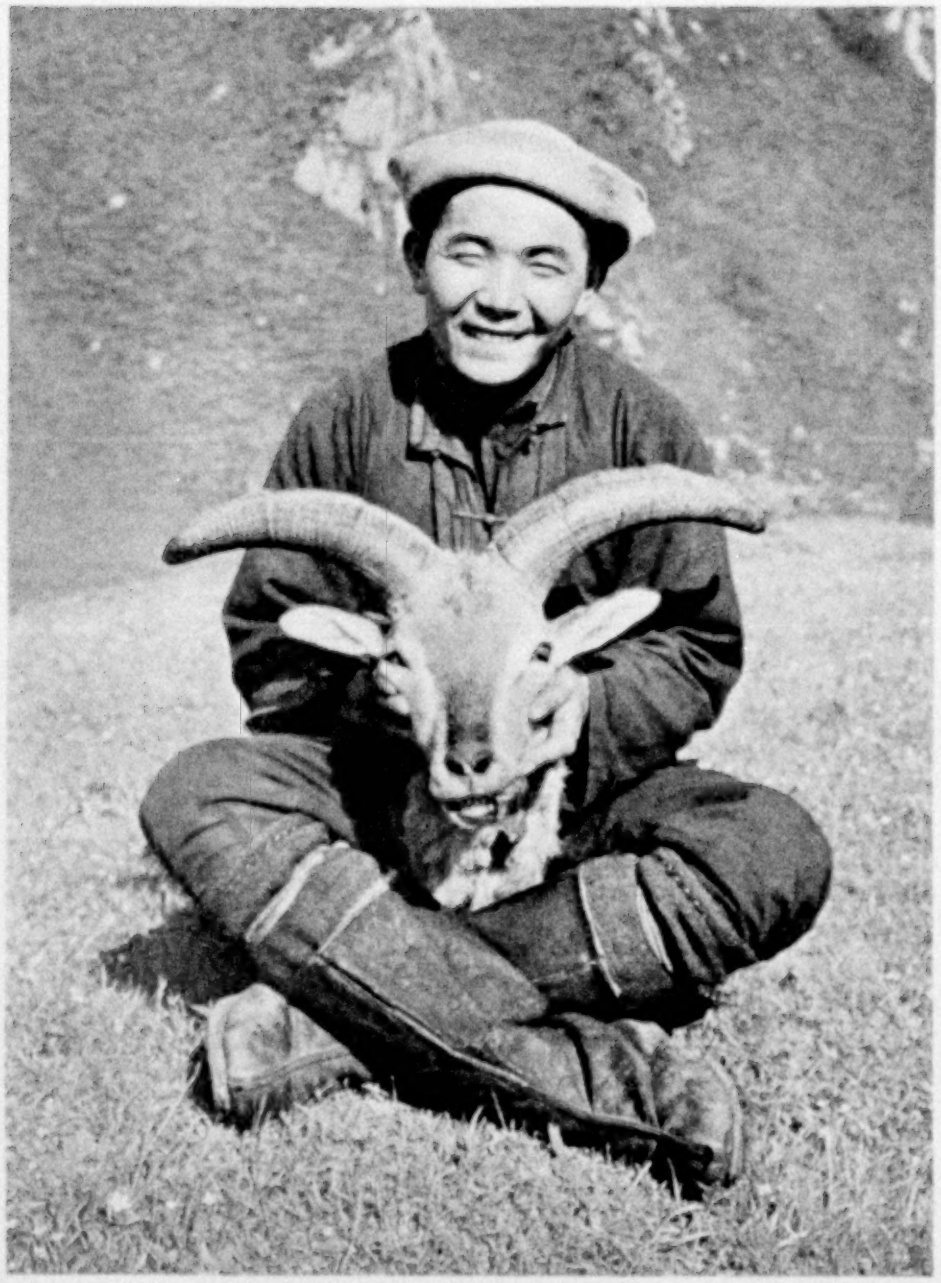
Gomba pulled me aside and motioned me not to breathe while passing the dying nomads. He gave them a wide berth. I assumed it was relapsing fever and doubted that it was due to plague.

We pitched camp at 12,500 feet elevation, at the foot of the trail which led to Amnyi Druggu. As we had arrived early in the afternoon, I decided to climb the



HIS CLAN'S CAMPS ARE A DAY'S JOURNEY WEST OF THE YELLOW RIVER FROM RADJA

This follower of Gomba (see illustration, page 172) was one of the author's escorts and was photographed in the juniper forest of the Hcha Chen Valley. Around his neck he wears a rosary and silver charm box. A sort of scalp lock hangs over his left shoulder.



A NASHI BOY WITH THE HEAD OF A BLUE SHEEP

These rare animals are found among the cliffs and gorges of the Yellow River in the vicinity of Radja (see page 159).

mountain for the view. It was a stiff job, after a hard day's ride, but we reached the top. Prayer flags decorated the summit, which we determined to be 14,450 feet.

Amnyi Machen's peaks were hidden in clouds. We had only occasional glimpses of the vast snow fields; yet the scenery was superb. In front lay the valley of the Cheb Chu, which joins the Yellow River below Hcha Chen Valley. To the left a deep valley denoted the Yonkokh; to the right was the Yikokh, which with the Domkokh forms the Cheb Chu Valley. I saw no trees whatsoever higher up toward the Amnyi Machen. The ranges were bare, rocky scree or grass-covered. The vegetation on Mount Druggu consisted only of alpines of various species, mainly umbellifers, Parnassia, anemones, Pedicularis, blue and red poppies (*Meconopsis*), legumes, and many Compositæ.

We lingered a considerable time at the summit, enjoying the beauty of a setting sun over the huge mass of the Amnyi Machen.

THE GLORY OF THE AMNYI MACHEN

Next morning we climbed again to the summit of Amnyi Druggu, which is in the very center of a spur facing the snowy peaks. Before us lay, in all its whiteness and purity, the glory of Amnyi Machen. Not a cloud was in the sky. We could photograph to our heart's content. I also took pictures looking east over the deep depression in which flowed the Yellow River, and north toward the Jupar Range, which we had previously explored (see text, page 166). Below us, in the valleys, camped the Ngoloks, apparently unaware of our presence.

While on the peak I observed a nomad climbing Amnyi Druggu from the west. Our presence did not disturb him in the least. He came to pay his devotion to the god Amnyi Machen by lighting juniper branches near an obo (see pages 171-2). He knelt down and bowed deeply three times toward the peaks, his forehead touching the ground.

From our camp at the foot of Amnyi Druggu we made excursions to the gorges of the Yellow River, photographing up and downstream from a bluff 1,500 feet above the river. We could see plainly

Ngarkigongma above Dakhso Canyon, whence we had photographed downstream (see text, page 166). The Yellow River, flowing here in bare canyons, describes long gentle curves as one looks south, but to the northwest the river can be seen only for a short distance, because of the steepness of the canyon and its sharp turns.

We retraced our steps up the Hcha Chen Valley, camping for the night in the juniper forest. Our nomads made themselves comfortable in a shallow cave. To do some hunting, we ascended farther up the Hcha Chen, to the mouth of a lateral valley.

MUTTON SHOULDER BLADES ARE TIED TO A YAK-HAIR ROPE AND FASTENED TO BRANCHES OF TREES, USUALLY OVER A TRAIL

These bones are inscribed with the sacred formula, "Om mani padme hum." As they are suspended over the path, the traveler is bound to push them aside when passing; and when he sets them in motion he says all the prayers written on them for the good of the party who hung them up.

ONLY TWO SEASONS—SUMMER AND WINTER

From a botanical, or rather dendrological, standpoint, the region was disappointing. The altitudes were too high to permit tree growth. Even the valley floors around the Amnyi Machen reach a height of more than 15,000 feet.

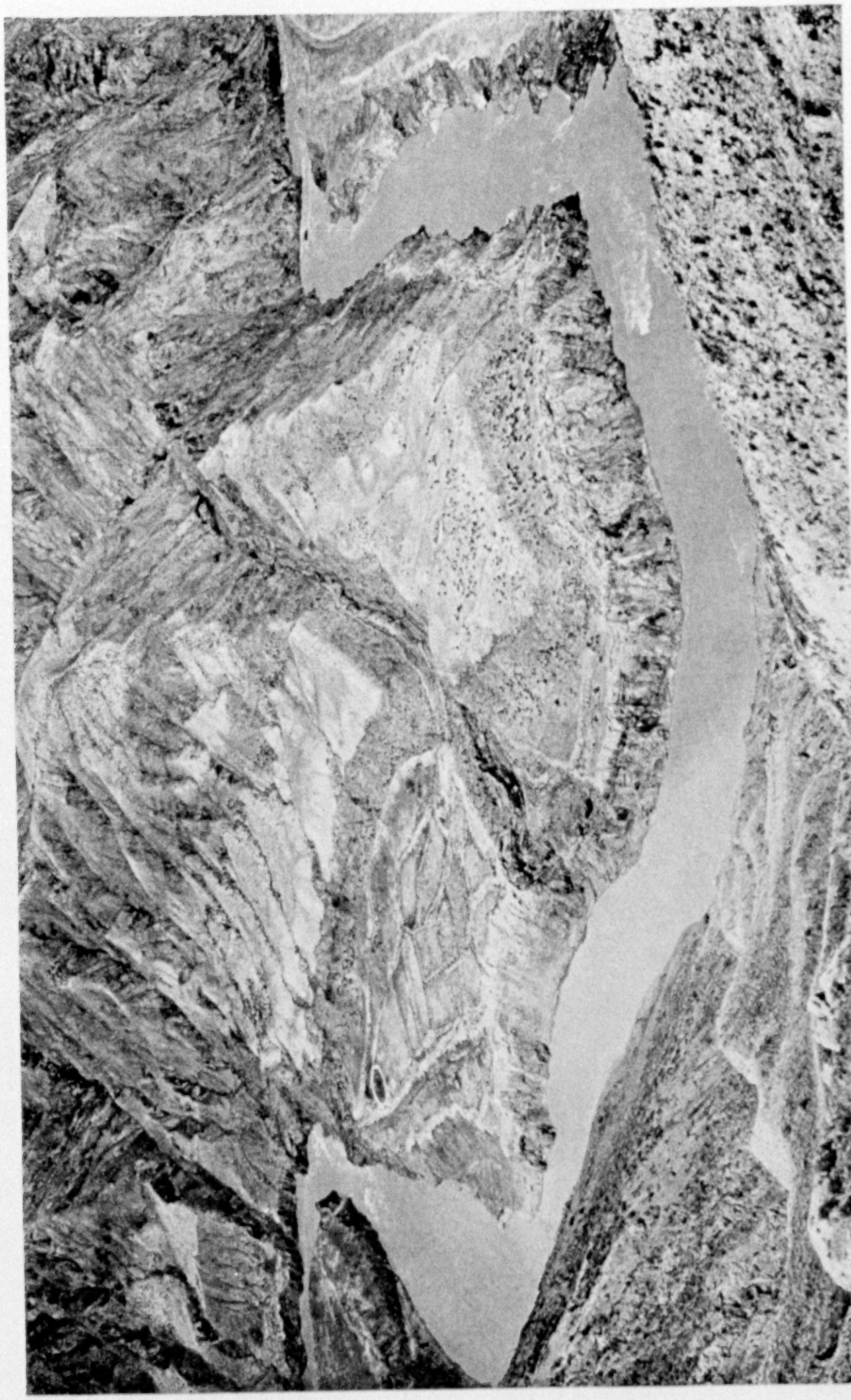
Of alpine plants we found many species; but the flora is not nearly so rich as that farther south. It must be remembered that here there is neither spring nor autumn; only summer and winter—and summer is short. Even in July, snowstorms are not uncommon. The ice in the stream beds of the valleys around Amnyi Machen apparently never melts completely; on our journey in the latter part of July, we found ice three feet thick in many places. All this naturally has its effect on the flora of the region.

One of the handsomest alpine plants we saw was a large pink to mauve and blue-flowered crucifer of a most delicate fragrance, suggestive of vanilla. There were apparently two species. They grew on alpine meadows as well as among rocks, but never lower than 13,000 feet.

In the upper Hcha Chen we literally ran into wapiti, deer, and musk deer. While the men went hunting, I climbed to a rocky peak above our camp and obtained a glorious view, especially of the great pyramid of the Amnyi Machen, the base of which

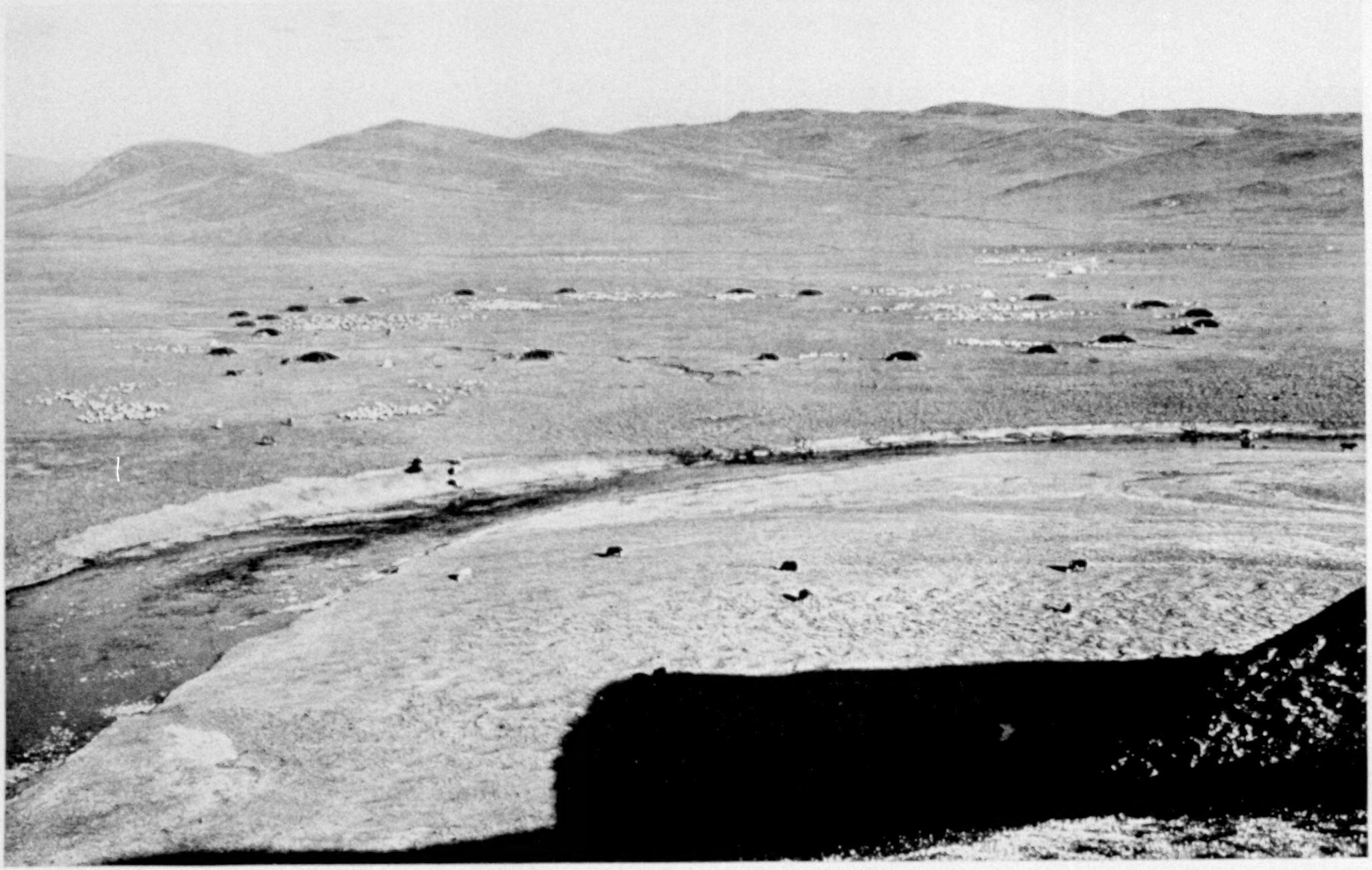
THE AMNYI MACHEN, SEEN FROM SHACHÜ YIMKAR AFTER CLOUDS HAVE GATHERED

"I shouted for joy as I beheld the majestic peaks of one of the grandest mountain ranges of all Asia." The central snow-capped peak towers to a height of more than 28,000 feet (see text, page 185).



A HORSESHOE BEND IN THE YELLOW RIVER NEAR THE MOUTH OF THE JUPAR NANG

The rocks forming the river bank are of a deep grayish-blue color.

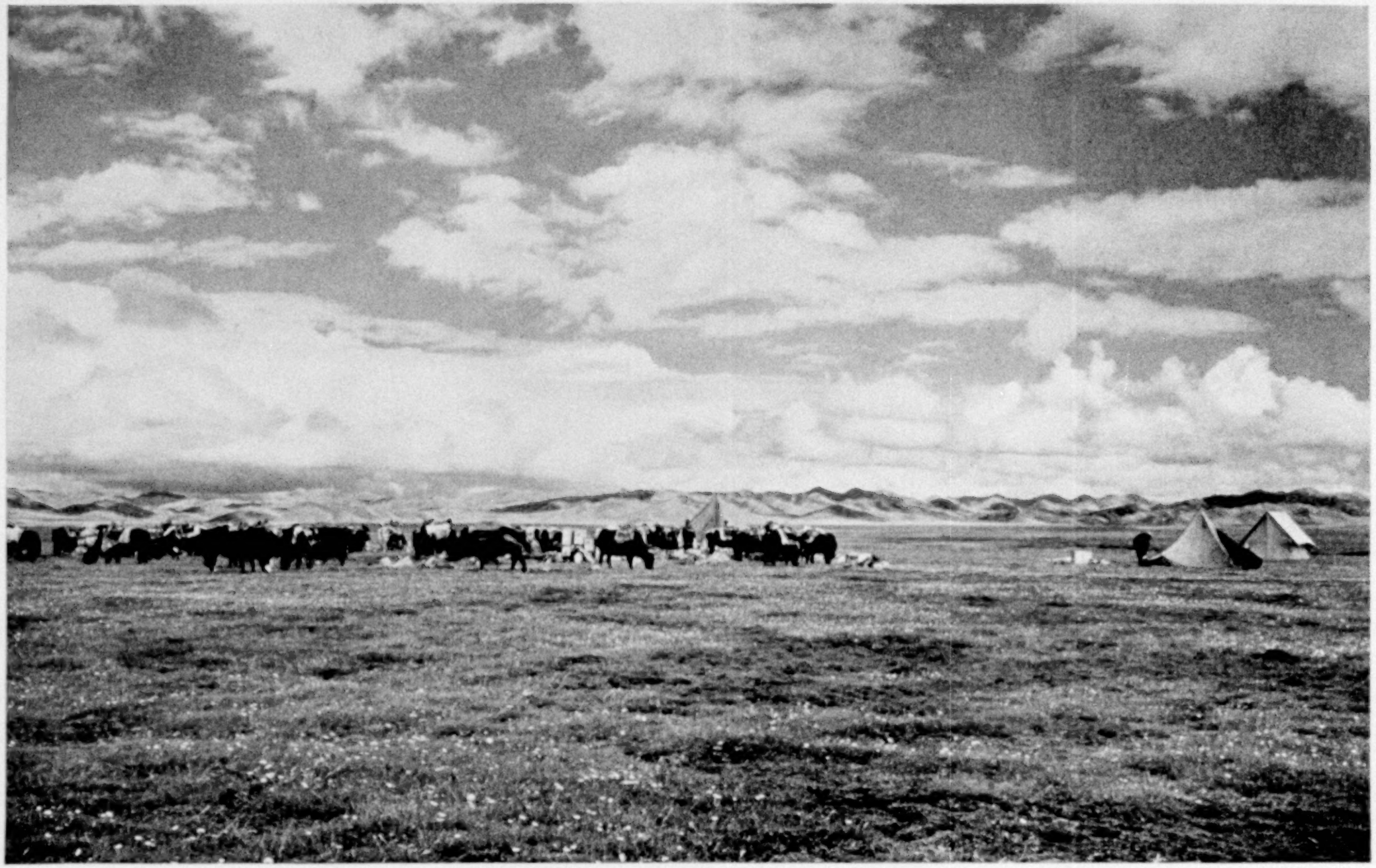


A CAMP OF THE RUNGWO NOMADS IN THE GRASS LANDS, ON THE BANKS OF THE HTSE CHU, AT AN ELEVATION OF 12,050 FEET

The tents are arranged in a circle and sheep, yaks, and horses are herded overnight in the center of the camp. Tibetan mastiffs are kept among the tents to warn the camp of approaching robbers. It is early morn and the sheep are being led out to graze. In the distance is a large white tent, which marks the camp of a living Buddha who prays for the nomads.

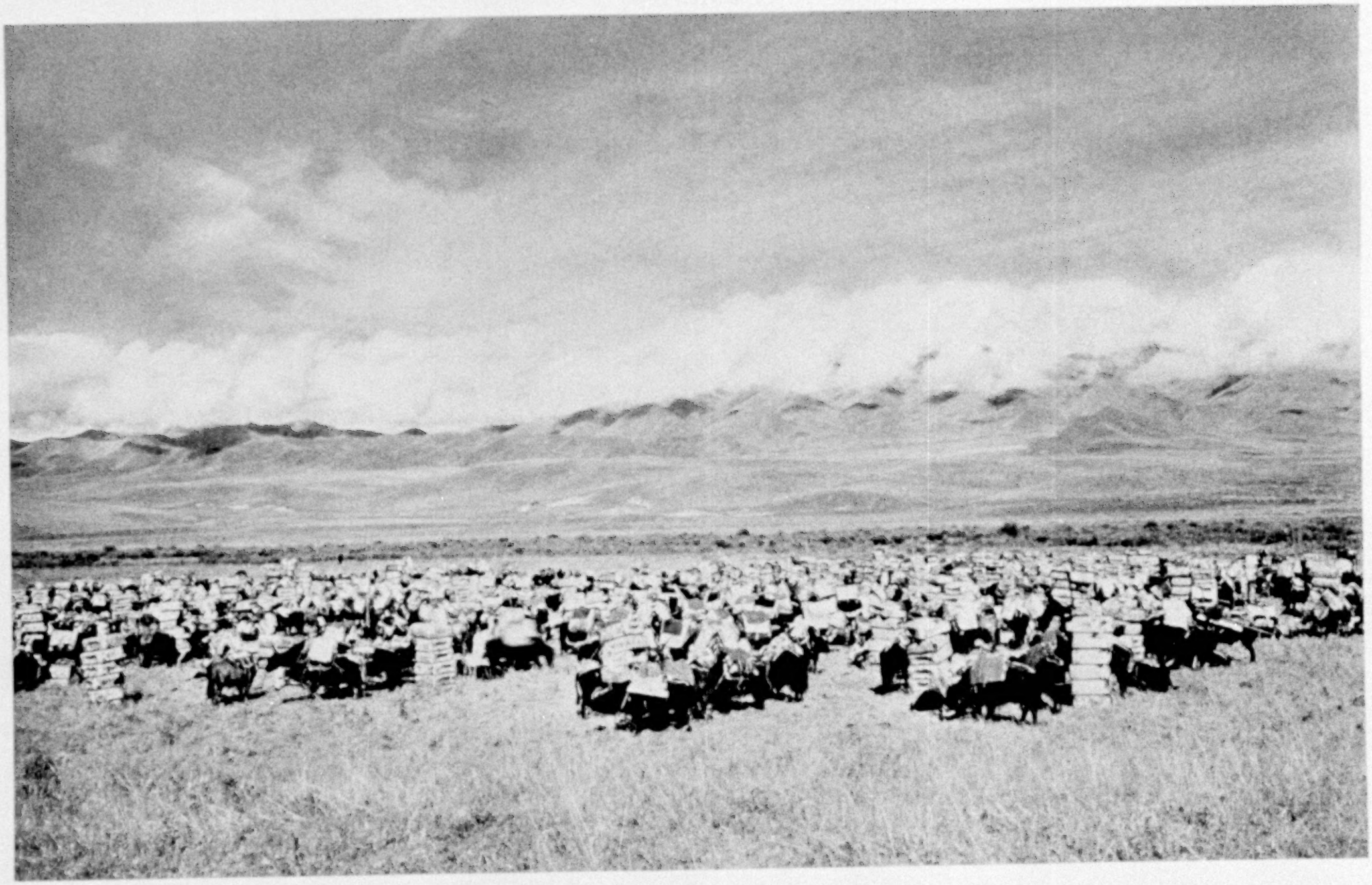
A GROUP OF TIBETAN NOMADS, WITH THEIR YAK-HAIR TENTS, SHEEP, AND PONIES, IN THE GRASS LANDS EAST OF THE KOKO NOR

Most of the women of this family braid their hair in 108 tiny pigtails (see, also, pages 140, 160, and 183). They are richly dressed, to the envy of women whose men own fewer flocks of sheep. These nomads stared in wonder at the white visitor's tables, chairs, and tents—marvels they had never seen before.



MAKING CAMP ON THE GRASS LANDS AT AN ELEVATION OF 11,800 FEET

On the return from the Amnyi Machen adventure, the author and his party pitched their tents on this plain prior to negotiating the 13,400-foot Wanchen Nira (Pass).



A TEA CARAVAN HALTED IN THE SONG CHU GRASS LANDS WEST OF LABRANG

The caravan consisted of 800 yaks and had been 20 days en route from Sungpan, in northwest Szechwan. The tea, of the poorest grade, was composed of large leaves and twigs. It was grown in the Min River Valley, near Kwanhsien, in Szechwan, ten days south of Sungpan. In Kwanhsien this tea sells for $3.00 a bale of 120 pounds, but in the grass lands the price goes to $30 and $40 a bale.

THE TENTS OF A NOMAD TRIBE ARRANGED IN A CIRCLE

The author encountered this summer camp four days' journey east of Radja, on his return journey to Labrang.

MAKING CAMP IN HIGH ALTITUDES CALLED FOR MAXIMUM PHYSICAL FORTITUDE AND POWERS OF ENDURANCE

The last of the author's caravan of 60 yaks reaches the Sokwo Arik nomad encampment, at an elevation of 11,450 feet, in the grass lands west of Labrang.

A NOMAD WOMAN OF THE KOKO NOR REGION

She wears her hair in 108 plaits in honor of the 108 volumes of the Tibetan classic, the Kandjur (see "Life Among the Lamas of Choni," by Joseph F. Rock, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1928).

HER ORNAMENTS ARE SUPPORTED BY HER 108 PIGTAILS

Most of the decorations of a Tibetan nomad woman are worn on her back. The bowllike pieces of silver are fastened to strips of red cloth. The picture was taken en route to Rako, in the grass lands east of the Koko Nor.

THE GOD AMNYI MACHEN, AS TIBETANS CONCEIVE HIM TO BE

This painting, in the vestibule of the chanting hall in Atuntze Monastery, northwest Yünnan, represents the god on a white horse. Since he dwells in the snow peaks, those in the background represent the Amnyi Machen Range, with a sun and rainbow (left) and a moon (right). Below him is the Goddess of Springs, with snakes in her hair, on a dragon. The woman riding a deer on a cloud (upper right) is the god's wife. Below her is a guardian god of Amnyi Machen, who is supposed to ride a cow. From top to bottom, on the left, are two lamas; a god known as Tangla and usually pictured as riding a dragon; the god Dontram, on a tiger, and below him the Stone-Mountain god, Tsan. All Tibetans worship Amnyi Machen; every monastery has either a picture or image of him. *Amnyi* means "old man" and corresponds to our "saint." *Ma* means "peacock" and *chen* "great."

was shrouded in billowy clouds. To linger was impossible, as a storm threatened. I descended rapidly to camp, arriving just as the storm broke. When I awoke the next morning, the whole landscape had undergone a change. Not a vestige of green was visible. All lay buried in a deep mantle of snow.

Clouds were hanging heavily over the grass and the spurs around us. We broke camp early. The Tibetans had slept outside without a tent or shelter, save their felt coats, in which they rolled up like cats. Yet they were cheerful and happy, as if they had slept in feather beds. When their tea was ready, one man would

take a large ladle, dip it into the pot, and, amid the chanting of prayers, throw the tea into the air as an offering to the mountain gods. Then all would squat down and eat their frugal meal of tea, butter, and barley flour.

From our Hcha Chen Valley camp we climbed the opposite valley wall, deeply covered with snow. Red and blue poppies, bright, fresh, and unharmed, looked happily out of their bed of snow. They are as hardy as the people of this region.

The higher we climbed, the boggier became the ground. We crossed a ridge at 14,100 feet elevation as the clouds began to disappear in spots, and the sun peeped faintly through the mist, necessitating snow glasses as protection against snow blindness. We found ourselves now in the Tarang Valley. Here the boys went hunting, and brought back a male musk deer, a broiled steak of which was a welcome addition to our scanty bill of fare.

Early the following day we decided to climb Shachü Yimkar in order to obtain still better views of the Amnyi Machen. The gods again were favorable to us, for the snowstorm had cleared the atmosphere and a cloudless sky greeted us. The slopes and the summit of Shachü Yimkar were a sea of loose slate. Tiny rosettes of Saussureas, with woolly heads resembling a drum major's shako, grew among the slate slabs.

I shouted for joy as I beheld the majestic peaks of one of the grandest mountain ranges of all Asia. We stood at an elevation of nearly 16,000 feet, yet in the distance rose still higher peaks—yet another 12,000 feet of snow and ice! Undoubtedly the dome Drandel Rung Shukh is the highest part, although the great pyramid Shenrezig is a close second and more imposing. The third in size and the central peak is Amnyi Machen, whence the range derives its name. In it the Tibetans believe Amnyi Machen resides. Not being supplied with a theodolite, I could not take the actual height; but from other observations I came to the conclusion that the Amnyi Machen towers more than 28,000 feet (see page 176).

With difficulty I tore myself from that sublime view—a view of the eastern massif of the mountain from west of the Yellow River which no other foreigners had ever had. I remained for some time alone on that isolated summit, lost in reverie and easily comprehending why the Tibetans should worship these snowy peaks as emblems of purity.

As this issue of the NATIONAL GEOGRAPHIC MAGAZINE goes to press, a letter, seven weeks in transit, comes from Dr. Rock, announcing his safe arrival in Likiang, Yünnan Povince, China, after a thrilling escape from Yungning, where his party had been imperiled by bandits for many days. Retiring by stealth from Yungning, Dr. Rock describes how he and his followers crossed the Yangtze: "It took us two days to make the crossing with the assistance of 22 natives, who worked like Trojans from early morning until after sunset, stark naked, each with only an inflated goatskin tied to his stomach. They would plunge into the rushing river and push us across, as we each sat upon two inflated goatskins. Three men would pull and two would push, and yet we were carried downstream for more than a mile. As we came in contact with a whirlpool we were spun about as on a merry-go-round. All the natural-color photographic plates, cameras, trunks, botanical and ornithological specimens, and the mules and horses of our caravan were finally set across, with the loss of but one mule."

It is hoped that Dr. Rock, having completed his three years of exploration along the China-Tibet border for the National Geographic Society, will be able to return to America late this spring. Accounts of his experiences and of his notable photographic surveys of mountains hitherto unknown to the outside world will appear in subsequent issues of the NATIONAL GEOGRAPHIC MAGAZINE.

THE EDITOR.

Photograph by W. Robert Moore

ALMOST EVERY SORT OF PRODUCE FLOODS THE MARKET

Nature is bountiful in Sumatra, and the rich soil yields abundantly of virtually anything that is planted. The shopper at Fort de Kock has a bewildering variety of fruits and vegetables from which to choose (see text, page 194).

AMONG THE HILL TRIBES OF SUMATRA

By W. Robert Moore

Author of "Through Java in Pursuit of Color," in the National Geographic Magazine

"WONDERLIJK!" exclaimed a genial Dutch resident of Batavia, floundering for descriptive adjectives, as he waxed enthusiastic and almost inarticulate over Sumatra. "You *must* see the *Padangsche Bovenlanden* (Padang Highlands) and *Toba Meer*."

Following his advice, we sailed at noontime from Tandjoeng Priok, the harbor of Batavia, on a small west-coast Sumatran steamer named after a certain somebody who has helped make Holland's colonial history. Besides a few business men and half a dozen travelers, it carried a deckful of Javanese men and women laborers for the Sumatran tea, rubber, and tobacco estates.

A noisy group crowded the pier to wish farewell to friends who lined the steamer rail. With shouts and excited gestures pill-box hats were tossed out toward the departing steamer, but a surge from the propellers sent them bobbing back toward the dock—and we were off for Padang.

The first European to include Sumatra in his travel itinerary, so an early historical chronicle testifies, was none other than that Venetian prince of wanderers, Marco Polo.* Other early records direct attention to the visit of Ludovico di Varthema, of Bologna, who halted his caravels on the Sumatran coast during a Far Eastern cruise in 1505.

In 1599, Cornelius Houtman, after locating the new Indian trade route for the Dutch around the Cape of Good Hope, ventured out to north Sumatra, where he lost his life at the hands of the Achinese. He had taken the initial step in one of the Netherlands' most expensive and hard-fought colonial enterprises.

Sumatra, the bounteous but unfriendly spice land of these early voyagers, is only slightly smaller than the aggregate areas of our nine New England and Middle Atlantic States and, longitudinally speaking, is at the world's end from Washington, D. C. It is furthermore some thirteen times larger than its Netherlands guardian, but has a somewhat smaller population (see, also, map, page 189).

Sprawling at an angle across the Equator, with the tropical sunshine and monsoon rains spilling over its rich volcanic soil, Sumatra is generously favored by indulgent Nature. As yet, however, its manifold agricultural and mineral resources have been exploited to only a small fraction of those of her sister island, Java.*

SILENT KRAKATAU REVIVES TRAGIC MEMORIES

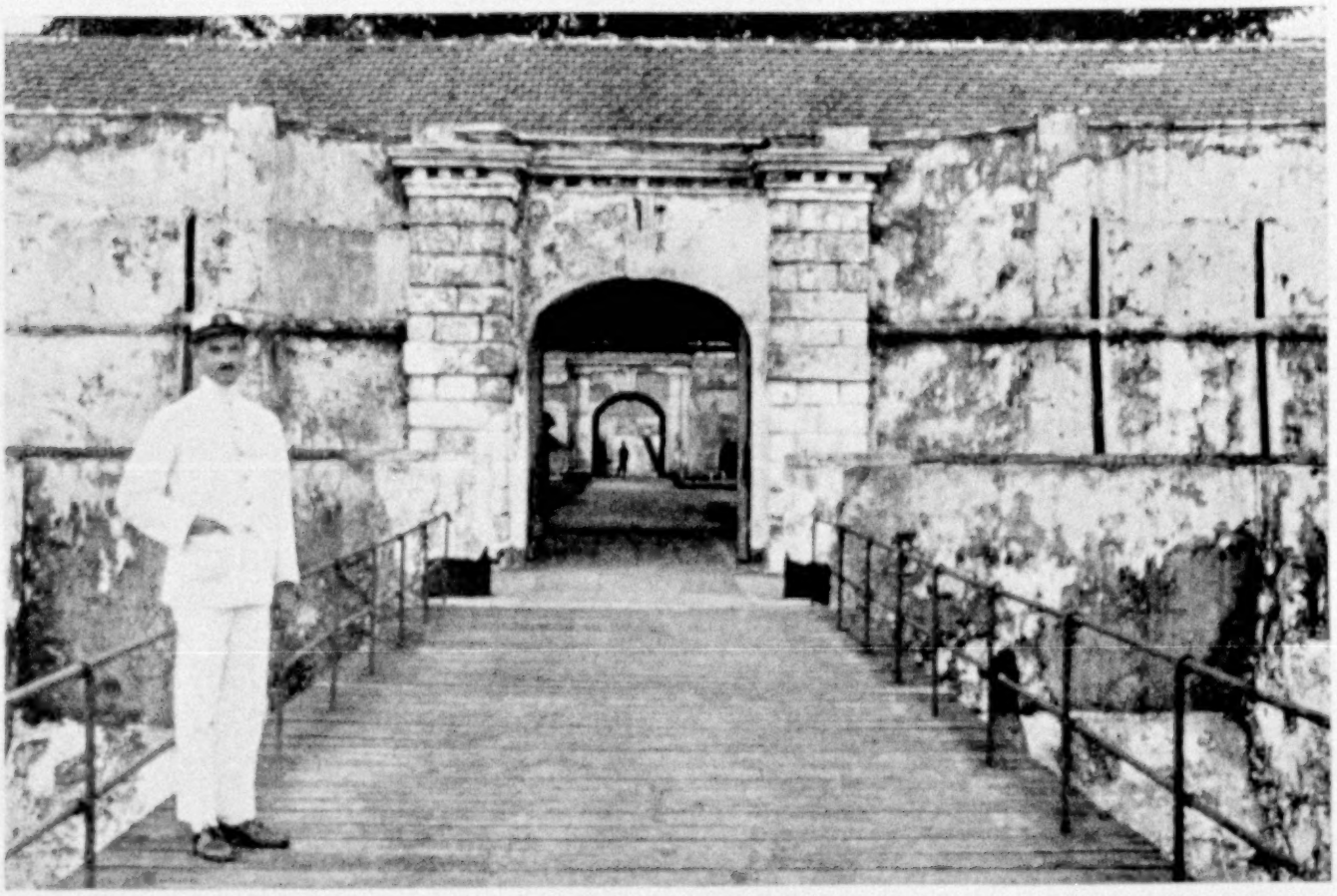
By eventime the Java Sea had slipped astern and our steamer nosed westward through the placid waters of the island-studded Sunda Strait and into a flaming golden sunset. Off to port lay the island of Krakatau, bathed in evening splendor, silent for the time and innocent in appearance. Yet Krakatau evokes the memory of the overwhelming tragedy wrought by its violent eruption in the summer of 1883, when thousands of lives were swallowed up by the devastating tidal wave that swept the shores of the surrounding regions. At that time half of the island disappeared beneath the sea, and the fine volcanic ash thrown into the upper air currents continued to color the sunsets with purple-red hues for nearly two years.

In the early months of 1928 the volcano again awakened, rumbled and hurled rock and boiling mud, together with heavy clouds of steam, from an under-water fissure to a height of hundreds of feet. Repeated disturbances have followed. People living in the once-destroyed regions are justly nervous over its renewed activity. Observers are, therefore, carefully following its temperamental movements in order to broadcast a warning should it show signs of increasing activity.

As we moved on, the orange-red sunlight flared higher on the clouds and gradually died out behind the Sumatran hills, taking with it the gold-tinged purples on the island peaks. Krakatau became quite sullen.

* See "The World's Greatest Overland Explorer," by J. R. Hildebrand, in the National Geographic Magazine for November, 1928.

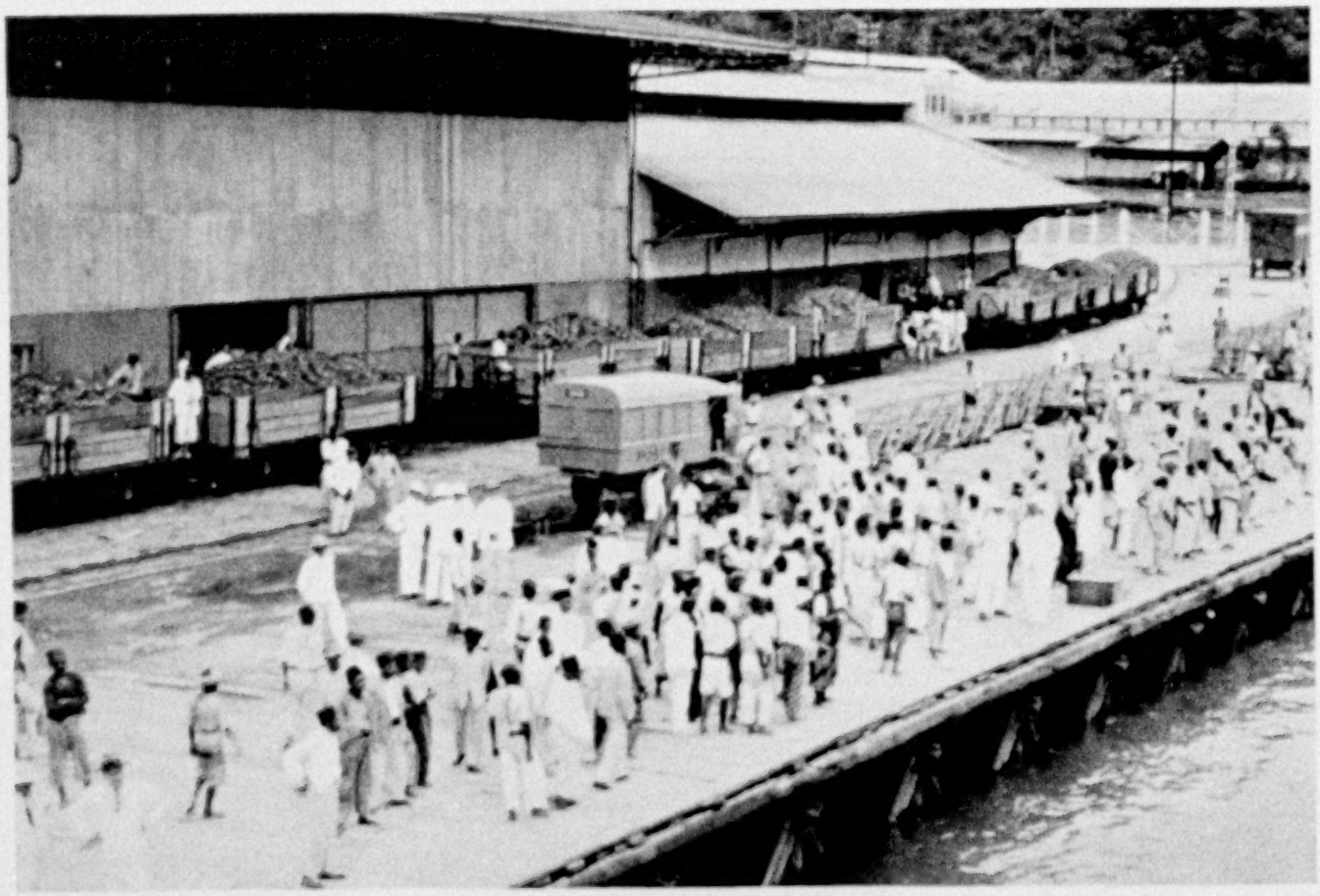
* See "Through Java in Pursuit of Color," by W. Robert Moore, in the National Geographic Magazine for September, 1929.



Photograph by Alice Schalek

BRITISH SOLDIERS BUILT THE OLD CASTLE NOW USED AS BARRACKS AT BENKOELEN

More than a hundred years ago Sir Stamford Raffles established headquarters at this place, and for a time it was a lively trading center. With the development of Singapore, however, it lost its commercial importance.



Photograph by W. Robert Moore

EMMAHAVEN IS THE SHIPPING POINT FOR OMBILIN COAL

Much of the fuel used in this part of the Far East goes out from this busy port on the west coast of Sumatra. The wharves are connected by an excellent railroad with the extensive mines in the highlands (see text, page 189).

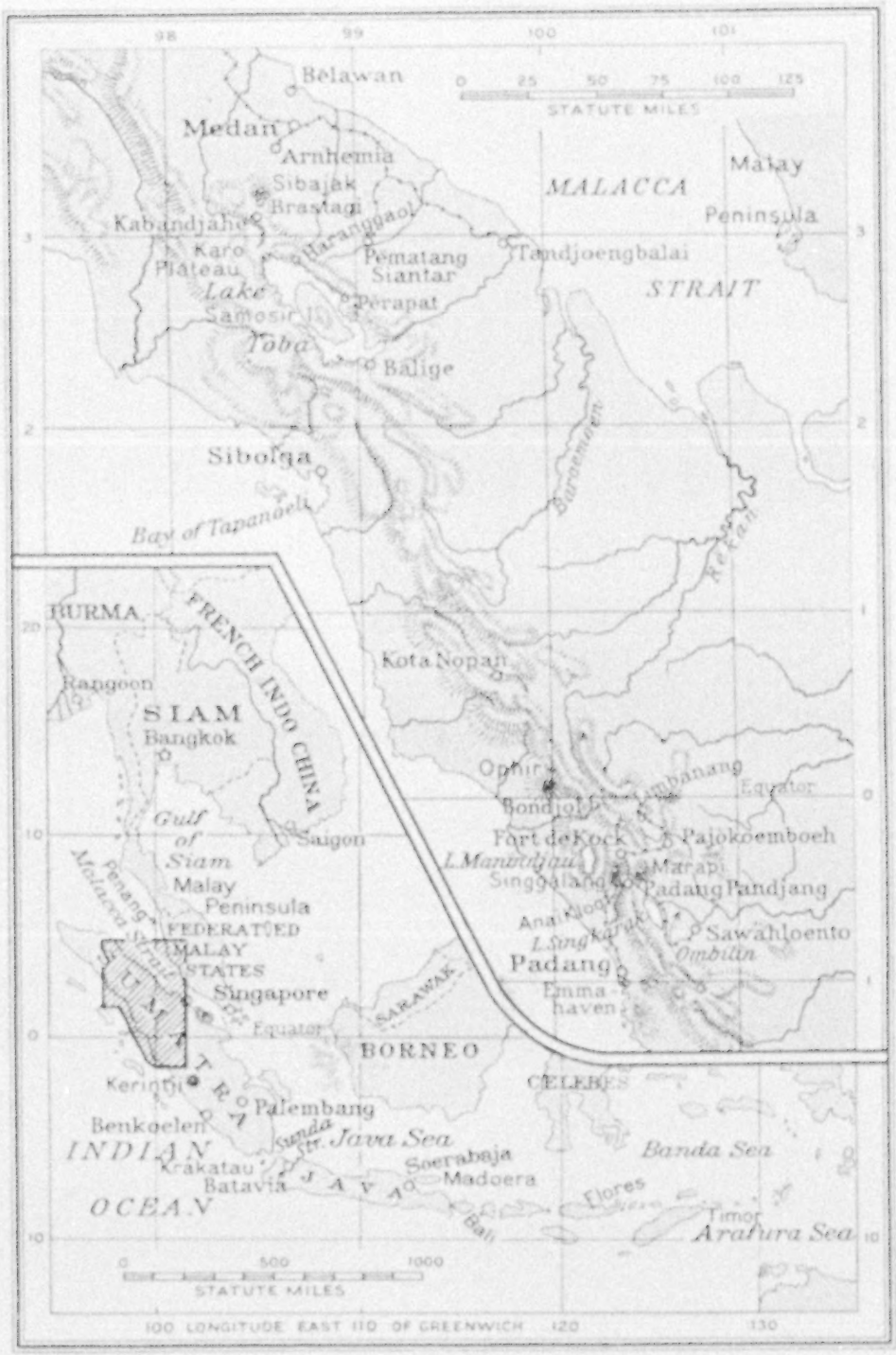
Benkoelen, the chief halting place along the coast below Padang, had its beginning in 1714, when the English established Fort Marlborough here. After the rise of Singapore, the post was ceded to the Dutch in 1824. The old fort still stands, in a partly ruined state, as a reminder of early English supremacy.

The Government is now threading roads through the south Sumatran hills and jungles to connect with a single main railway, but large regions are still undeveloped. Petroleum, however, has been the touch of Midas in the districts near Palembang, on the east side,* and two large companies carry on extensive operations there.

Cruising north toward Padang, our ship passed among numerous delightful islets, green-capped and wreathed with slender palms, and finally swung into the lovely Koninginne Bay (now Emmahaven). Verdant vine-clad hills, fresh from a tropic shower, rose on three sides to inclose the blue-green water, while several white-sailed fishing boats, equipped with double outriggers, darted across our prow toward a village of bamboo shacks in the shadows of the bay.

Steamers tie up at the docks of Emmahaven; Padang itself is some 20 minutes by motor car or train around the hills.

* See, also, "By Motor Through the East Coast and Batak Highlands of Sumatra," by Melvin A. Hall, in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1920.



Drawn by C. E. Riddiford

SUMATRA, ASTRIDE THE EQUATOR

The shaded area of the lower map is the territory shown on a larger scale above. The author landed at Emmahaven and traveled northward through the highlands, then down to the northeast coast at Bĕlawan.

Puffing switch engines shunt carloads of coal along the wharves and an overhead railway extends out over the water, so that vessels can refuel directly from the dump cars. The coal comes from the extensive Government mines of Ombilin, up in the Padang Highlands.

AN ALTITUDINAL JOURNEY OF DELIGHTFUL SURPRISES

The 54-mile train or motor ride to Fort de Kock, in the Padang Highlands, is an

Photograph by David J. Martin

EMMAHAVEN FISHERMEN ARE WELL PROTECTED FROM SUN AND RAIN

altitudinal journey filled with delightful surprises. The passenger trains do not elicit much enthusiasm from one accustomed to the excellent service of the State railways in Java, but one must recall that this line was built primarily to open the coal territory.

About half of the way the railway and motor road run through a coconut plantation district, with a few half-hidden villages, where the odor of copra hangs heavily in the air. In the succeeding miles the ascent is rapid and the engine is shuttled around to the rear of the train, so that it pushes the cars on a cogged line nearly all the rest of the way up the 3,000-foot climb. We were thus able to stand on the narrow platform on the front coach and enjoy "observation" privileges up the Anai Kloof, a beautiful defile.

As the train wound about in sharp curves between the steep hills which closed in on either side, the scenery became a display of luxuriant tropical foliage. Large trees and thick twining vines mantled the precipitous cliffs. We skirted along the narrow cut on the mountain side and crossed several steel bridges which spanned the river that rushed down through the rocky pass.

At one sharp bend a waterfall broke over the ledge of a high, vertical wall of rock and came plunging down into a jagged basin at the very edge of the railway track. It then cascaded down a ravine to join the river.

The train climbed slowly through the Kloof and at last reached the village of Padang Pandjang, between the two volcanic cones of Marapi and Singgalang, which rise more than 9,000 feet. As usual, everything was dripping from a late afternoon rain. This district enjoys the reputation of having one of the largest annual rainfalls in the Dutch East Indies.

At Padang Pandjang one branch of the railway turns southeast into the coal territory. Several years ago, when Marapi erupted, this village was partly destroyed and it has not been entirely rebuilt. One often wonders why the Sumatrans build their houses on the very slopes of the volcanoes, where they are in constant danger; perhaps, like the residents behind our Mississippi dikes, they know that the soil is

Photograph by Alice Schalek

REFRESHMENT VENDERS THRONG SUMATRA'S RAILWAY STATIONS

A kind of sour mandarin, the juice of which makes an excellent drink, is offered to passengers journeying from Fort de Kock to Padang. The train service is surprisingly good (see text, page 189).

Photograph by W. Robert Moore

NO MALADY BAFFLES THE "DOCTOR" AT FORT DE KOCK

Out of shells, bird beaks, claws, teeth, horn, dirty wood—all smeared with black grease—this confident practitioner compounds "cures" for all ills. What self-respecting ache could withstand such treatment?

Photograph by W. Robert Moore

MEN ARE A NEGLIGIBLE MINORITY IN THIS WOMEN'S WORLD

Only a motion picture in color could convey an idea of the brilliance of the scene at Fort de Kock on market day (see, also, Color Plates I, VII, IX, XV, and XVI).

Photograph by David J. Martin

NET TENDERS DO IMPORTANT WORK IN SUMATRAN FISHING

These boys wade out into the shallows near the shore, set the snares, and draw them tight after the canoemen drive the golden carp into them.

Photograph by W. Robert Moore

THE MEDICINE MAN'S STAFF BEARS HIS TRIBAL EMBLEM

Among the Karo Bataks the carved figure of a man on a horse has special significance (see text, page 210).

rich and are ever hoping that each disaster may be the last.

On the final stage to Fort de Kock, after leaving Padang Pandjang and just before crossing the 3,000-foot saddle between the two mountains, we caught a splendid sunset view of the lovely blue waters of Lake Singkarak, nestling between the hills. This lake is one of the scenic spots of the highlands and has been aptly compared with the lakes of Italy.

Scattered around in the many clumps of coconut palms that dotted the landscape were little groups of houses having peculiar, upturned, hornlike gable ends. This characteristic roof construction is in accord with the family customs of the Menangkabau people of the highlands. Unfortunately, much of the picturesqueness is lost because glaring corrugated tin roofs have largely replaced the native thatch.

WOMEN RULE THE HOMES IN THE HIGHLANDS

In the Padang Highlands the women are rulers of the household and control both the possessions and the children. The husbands, free from such responsibility, help work the family rice fields, and they are skillful craftsmen in both wood and metal. Many of the houses exhibit unique artistry in the carved designs on the wooden walls.

Possessions accumulated by men pass to their sisters rather than to their wives.

The day following our arrival at Fort de Kock was market day. By sunrise hundreds of people, mostly women, were filing in stately parade into the *passar*, or market, with huge bales and baskets of produce on their heads. Every road leading into the city was a colorful pageant of country folk arriving in their gayest holiday attire. Market days in Sumatra are more than occasions for mere bartering and selling; they are social events as well. Had Marco Polo visited a native passar in the Padang Highlands on his Sumatran trip, he would undoubtedly have written a glowing report about the island.

We walked out to the Karbouwengat, or Water Buffalo Gorge, just beyond the city, to see that remarkable ravine, which was formed ages ago by a river running down past the bases of Marapi and Singgalang. The two walls of gray sandstone are tinged here and there with red, and the narrow valley is now checkered with rice fields. Far away we could see an endless line of market-goers marching down the trail from the bluff, fording the shrunken river, and following the curving roadway that crossed the valley and zigzagged up through an opening in the near-by mountain wall. The vista down the gorge was not unlike some of our own magnificent Western scenery (see Color Plates X and XI).

SUMATRA WOMEN ARE CAMERA-SHY

On a sunshiny bend of the winding trail, a short distance down in the defile, I set up my color camera to try to picture some of the slender, laughing girls and women who stopped to rest from their heavy burdens, which they had been carrying on their heads for miles. High-speed snapshots were all that could have recorded those comely maidens as they rescued their bundles and fled precipitately up the hill. Color photography is not adapted to moving subjects.

Women hurried past my camera in the shadow of the overhanging embankment; not one was willing to pose even for a few moments. Young boys passed, carrying baskets of chickens on their heads or driving an occasional sheep or goat destined for the meat stalls. A few men were driving donkeys laden with cinnamon bark, and now and then a bullock cart rattled by with a load of sugar cane; but most of the men wandered care-free along behind their overburdened womenfolk.

In one group that halted on the path was a young woman of queenly grace. Her features were finely molded; her oval face was fair, with a flush of pink from her morning walk; her light silk scarf was thrown back on her shoulders from her jet-black hair, and her teeth glinted like pearls, as she smiled at my request to be allowed to take her photograph. Yet nothing would induce her to pose alone; so I jokingly confiscated her basket of bananas and those of two of her companions and placed them in front of my camera; then, by further pleading, succeeded in getting the three to pose.

A group of idling men gathered; a few old women joined the crowd; and, with

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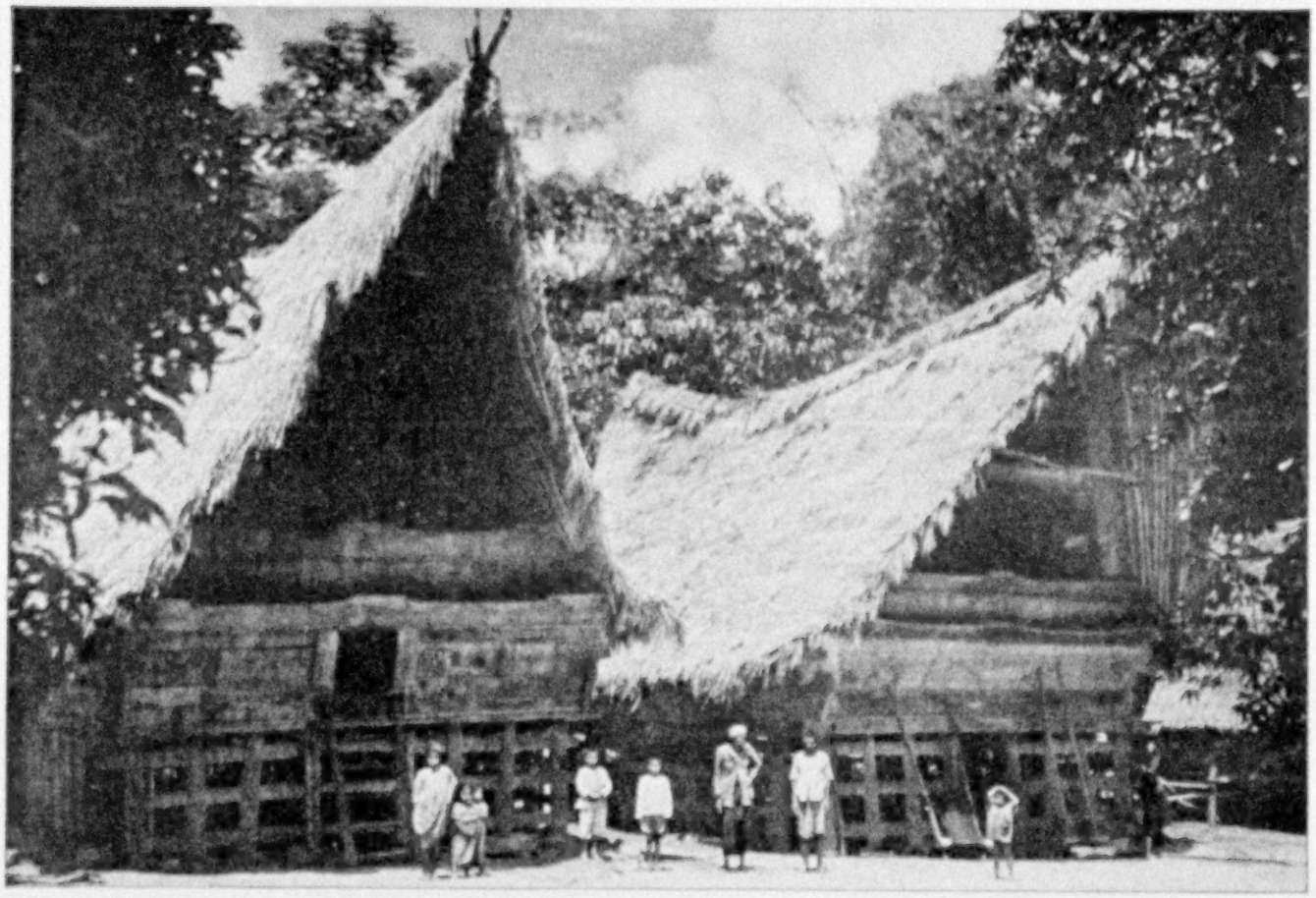
A FORT DE KOCK BELLE PUTS THE RAINBOW TO SHAME

Among the Menangkabau people, women are the rulers of the household, inheritors of all estates, and principal traders. When one of them goes to market, she dons the apparel befitting her station. Vivid colors, mingled without regard to harmony, flash from every part of her attire.



HOMES OF THE BATAKS RESEMBLE ARKS ON STILTS

Toba Lake natives set their boat-shaped houses on palings, leaving spaces under the floors for use as corrals at night and as work rooms for the women by day. The Menangkabau legend that Noah landed on Mount Marapi may have inspired this style of architecture.

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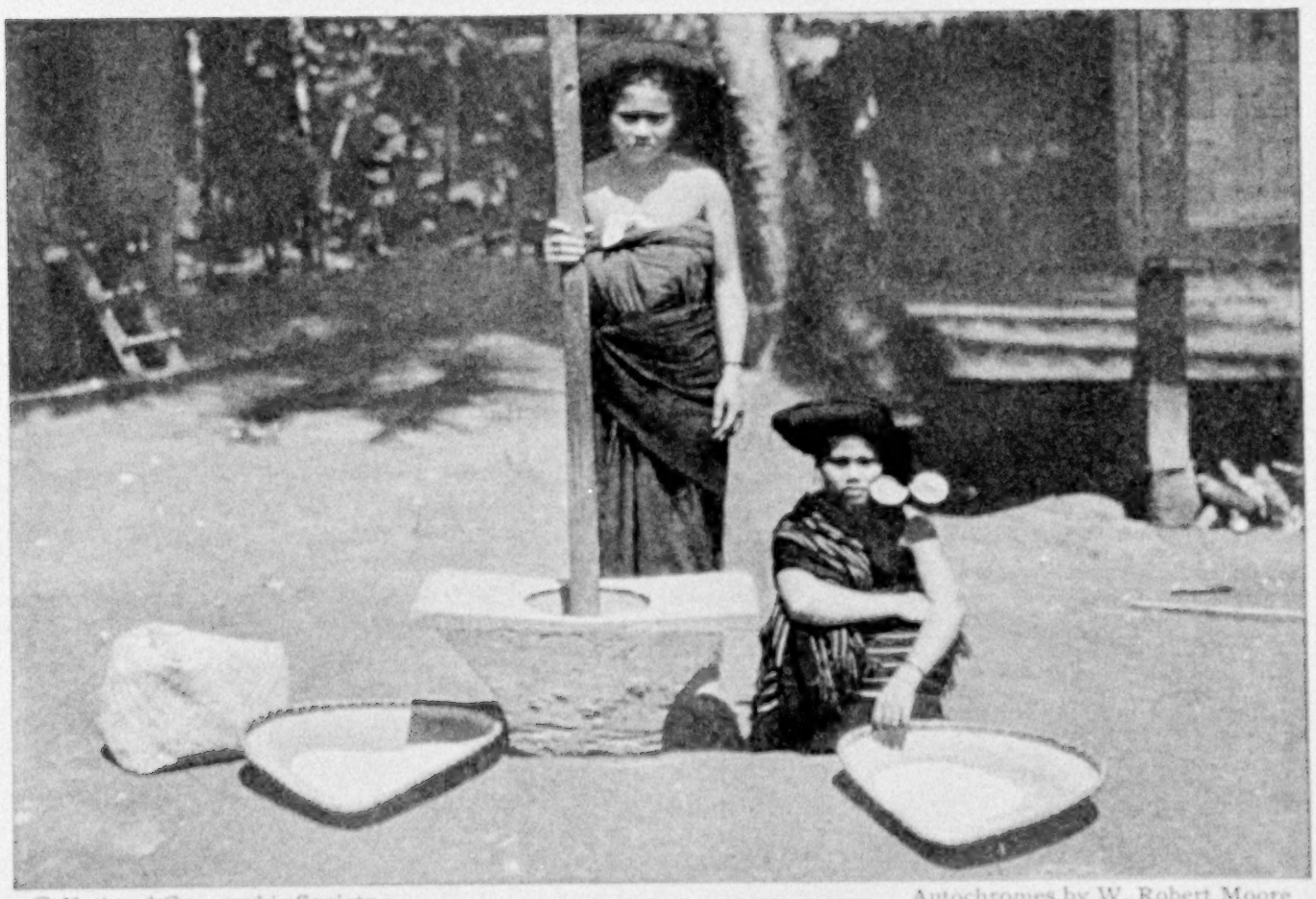
MENANGKABAUS LOVE COLOR, EVEN IN THEIR CHICKENS

Dressed in their best, and carrying all manner of showy produce, the natives come from every direction to the Wednesday and Saturday markets at Fort de Kock. Though the population of the town is only 2,300, the crowds that jam the streets in a kaleidoscope of brilliant hues at these times, often number 20,000 to 30,000.

BATAK HOUSEWIVES ARE PROUD AND INDEPENDENT

The women share in the profits as well as the labor of the farms. They make their clothing mostly of indigo-dyed homespun and for jewelry wear huge coiled-silver earrings attached for support to their pillowlike headdresses.



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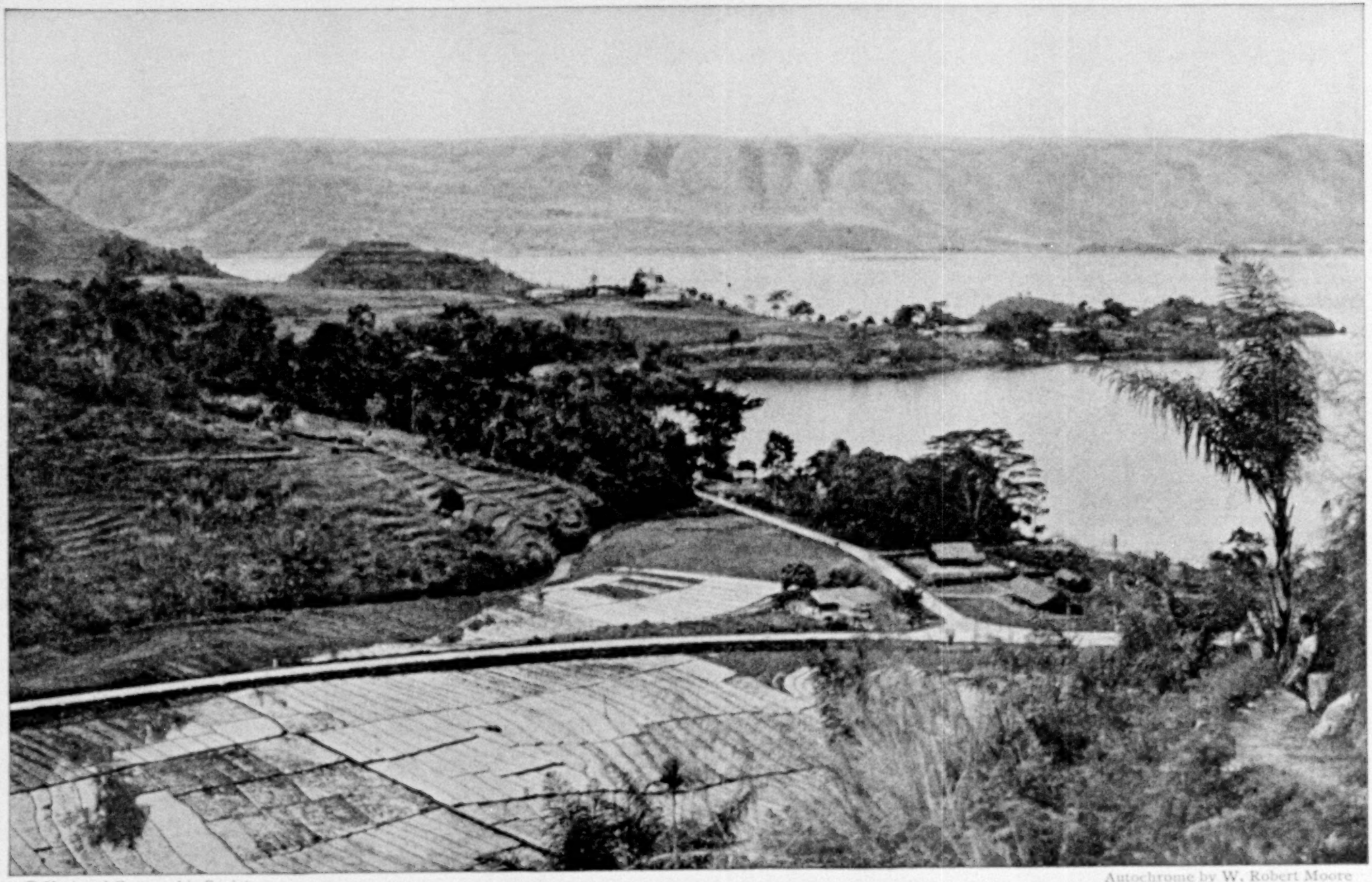
RICE IS THE STAPLE FOOD OF THE BATAKS

With long wooden pestles the women pound out the white kernels in primitive mortars and gather them in shallow baskets. The Dutch controllers must exercise constant vigil in seasons of poor crops and high prices to prevent the natives from causing famine by smuggling this cereal out of the country.



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PĔRAPAT HAS WON RECOGNITION AS A HEALTH RESORT

To this charming village built on a spit of land thrusting out from the southeast shore of Toba Lake, 3,000 feet above sea level, the road winds down from forest-clad uplands through terraced fields of rice. Both wet, *sawah*, and dry, *ladang*, methods of cultivation are in use here, and the farmers are prosperous.

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DIGNITY DISTINGUISHES THE BATAK GIRL

This young woman has a clear complexion, large brown eyes, and regular features, but her mouth has been marred by the chipping or filing of her teeth to the level of her gums. She wears a costume of homespun, with a huge silver earring held in place by a point of her padded cap (see also Color Plate III).

Autochromes by W. Robert Moore

THIS CHIEF'S PEOPLE WERE ONCE FEROCIOUS

Some of the older men in the jolly old Batak ruler's village near Toba Lake remember days of savagery, but now they are peaceful. Though taller, darker and more bearded than the true Malay, they are of Malayan stock, have straight hair, and show no trace of Negrito blood.

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Autochrome by W. Robert Moore

EACH BATAK VILLAGE HAS ITS COURT AND MARKET SQUARE

The structure in the foreground is used for native trials and public meetings, and on trading days barter goes on around it. In the gables are intricately woven designs of bamboo. The horned heads decorating the roofs indicate the number of animals slaughtered when the building was completed. They recall the ancient legend of the victory of the buffalo, champion of the Sumatrans, over the tiger, chosen fighter of the Javanese, in a battle to settle supremacy between the two peoples.

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Autochrome by W. Robert Moore

FEMININE MERCHANTS PREDOMINATE AT THE FORT DE KOCK MARKET

Dressed in holiday attire, the young banana seller invites customers with a flashing smile unmarred by filed teeth. The pepper vender, squatting beside her bright-colored vegetables, is a bit dubious about the propriety of posing for her picture. Both girls are of the Menangkabaus, a tribe which accords its women positions of honor and responsibility.

CIVILIZATION HAS COME ONLY RECENTLY TO THE KORINTJI

Until a Dutch Government force opened their country in 1906-07, these people were a warlike, hostile tribe isolated from the rest of the Sumatran natives by the mountains which shut in their high valley home.

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Autochromes by W. Robert Moore

THE KORINTJI CHERISH STRANGE RELIGIOUS RELICS

These sacred symbols are brought out and carried in procession on such occasions as ceremonials to ward off earthquakes, crop blight, or epidemics. The buffalo horns may contain supposedly spirit-inhabited bits of the bodies or blood of human sacrifices.

the united chiding and urging from the onlookers, together with my feeble linguistic efforts in Malay, several other blushing and abashed girls finally braved the ordeal of being "shot" for their color *portrets*.

What colors the Menangkabau women wear! Their scarfs, blouses, and sarongs were like a confusion of tints from a shattered rainbow (see Color Plate I).

BRILLIANT MARKET SCENES

In the market place only a motion picture in color could adequately record the massing crowd that moved about between the rows of sellers. One group was busy dispensing quantities of spices and bright red peppers; in another section tropical fruits lay heaped in piles on the ground. Vegetable sellers, peanut venders, and Indian cloth merchants were doing a thriving trade. In another part of the market were piles of great cabbages, such as I had never before seen, and in the fish market a row of women sat with baskets of huge golden carp for sale, while more of their scaly produce flapped about in tubs (see Color Plates II, VII, IX, and XVI).

Off in one corner of the market square sat an old medicine man with a layout of blackened, grease-smeared old bones, animals' teeth, gnarled roots, horns, and shells, from which he concocted bottles full of potent-looking fluids and powders—a sure cure for all ills. May Allah protect the users! (See page 191.)

People, piles of produce, odors, more produce and more people—such is a Padang market day, where from 25,000 to 30,000 country folk gather at the twice-a-week passar. On the other days of the week markets are held in other villages of the countryside.

The day following the Fort de Kock market, I joined a crowd on its way to the famous weekly passar at Pajŏkoemboeh, some 20-odd miles distant, at one time the largest market in the highlands.

Its attendance formerly was estimated at 30,000, but of late it has given way somewhat to Fort de Kock.

After a few days in Fort de Kock we purchased seats in a heavy Government motor bus and rumbled out of town early one morning, bound for Sibolga, across the island. We rattled along the excellent metaled road which wound through the hills. Off to the northeast from Marapi and Singgalang rose the volcanic peak of Ophir, so named by the early Portuguese, who thought they had rediscovered Solomon's famous gold mines, since quantities of gold were found in that region.

We rolled into the tiny village of Bondjol. Here was yet another market in full swing, with hundreds of people gathered about.

MONKEYS ARE TRAINED TO PICK COCONUTS FOR THE NATIVES

Early travelers returning from Eastern tropical voyages once got themselves branded as cheerful romancers when they related tales about indolent natives who had trained monkeys to climb the tall palm trees to pick their coconuts; yet when we halted at the village of Kota Nopan, in the midst of a coconut grove, there was plenty of evidence of the veracity of the stories. Several men and boys were working with monkeys on long strings (p. 206).

Clever little fellows, those monkeys. They climbed around from place to place in the fronded tops of the coconut trees and selected only the ripened coconuts.

Some were also working in a few kapok trees, picking and biting off the dry pods of kapok (tree cotton). As a young boy jerked at the long cord tied to his monkey's collar and cajoled the little sandy-haired laborer to keep him busy, I made some snapshots to prove the tale.

After more than two and a half days' travel, with night stops at Government resthouses, we dropped down from the plateau to Sibolga, on the Bay of Tapanoeli. Ours was one of the last long passenger trips on the heavy, low-speed trucks, for even as we roared into town the Government was receiving a fleet of swift, new passenger busses.

Sibolga, backed by green mountains and facing the coral strand washed by the waves of the Indian Ocean, was the old Tapanoeli, which once served, as did Benkoelen, as an early trading post for the British. To-day it is a sleepy, sprawling town, with only a moderate amount of foreign enterprise and export trade.

We left Sibolga on one of the comfortable, new passenger busses, on the road that swung abruptly eastward over the hills and across the island. As the car

Photograph by David J. Martin

YOUNG SUMATRA APPRECIATES A JOKE

Photograph from W. Robert Moore

BASKET MAKERS PLY THEIR TRADE AT PAJÖKOEMBOEH

Considerable skill in designing is shown by these craftsmen, who weave not only market hampers, but intricate bamboo panels for home decoration (see Color Plate VI).

BOYS AND MEN FLOCK AROUND THE PEANUT SELLER

Photographs by W. Robert Moore

OLD MEN AT BALIGE RECALL PRIMITIVE DAYS

It is only in the last 15 or 20 years that the Bataks of this region have been in touch with civilization (see text, page 210). The peculiar expression of the mouths is due to filed teeth.

Photograph by W. Robert Moore

NATURE PROVIDES AN EXCELLENT LABOR-SAVER IN SUMATRA

Easy-going natives outdo the clever traveler of fiction who flings sticks at climbing apes to draw a return fire of edible fruits. When the Sumatran needs coconuts or kapok, he simply sends a trained monkey up a tree for a supply, directing the little picker by calls and by cunning tugs on the long leash attached to his collar (see text, page 203, and Color Plate XII).

climbed the steep zigzagging motor road, which makes more than 600 curves within 20 miles, we had many panoramic glimpses of the palm-girt Bay of Tapanoeli, where scores of white-sailed fishing boats were running before the fresh Indian monsoon.

ONCE HOSTILE BATAKS HAVE UNDERGONE A GREAT CHANGE

In the National Library at Bangkok, Siam, I once found a fine leather-bound history of Sumatra which bore the publication date of 1811. It was written by a man who then best knew the Tapanoeli district. He gave many descriptions of the people, which for accuracy might almost be current reading to-day; but while he described the Bataks he gave little information about the interior of their country. His map showed long ranges of hills through the Toba Lake region, although he mentioned the rumored story of a great mountain lake which had never been seen by any except the Batak tribes.

It was, in fact, not until 1863 that a Dutchman, Dr. A. Neubronner van der Tuuk, succeeded in reaching the lake, which was held sacred by the natives, but he was forced to turn back immediately on account of the threatening attitude of the Bataks. An earlier party, composed of three Americans and two Frenchmen, had been murdered on the way.

To-day, thanks to efforts of the Dutch Government and the missionaries, the trip to Toba Lake and its surrounding territory can be made in perfect safety. In the last 50 years the Bataks have undergone a great change. They are no longer hostile to the white man and they have long since ceased the practice of the ceremonial eating (a fine distinction from cannibalism) of their elderly relatives and their enemies. They are now a peaceful agricultural and pastoral people.

We crossed long stretches of uncultivated, rolling plateau, which greatly resembled a bracken-covered English moorland. Then of a sudden we topped a rise in the road, and several hundred feet below lay green, terraced rice fields bordering the cobalt-blue waters of gigantic Toba. The magnificent view reminded me of Lake Titicaca, surrounded by the terraced fields of the Incas, in the high Andes.

Our bus rushed down the sharply in-

Photograph by W. Robert Moore

EVERY MAN HIS OWN COFFEE-GROWER

Most of the homes in the Padang Highlands have their small gardens with a few trees of the best varieties. The natives make a drink from the dried leaves as well as from the roasted berries.

SIBAJAK VOLCANO PRESENTS DIFFICULTIES TO THE PHOTOGRAPHER

Clouds of sulphur fumes prove that the giant is merely dozing. The author worked thus for two hours in the crater (see text, page 219).

Photographs by W. Robert Moore

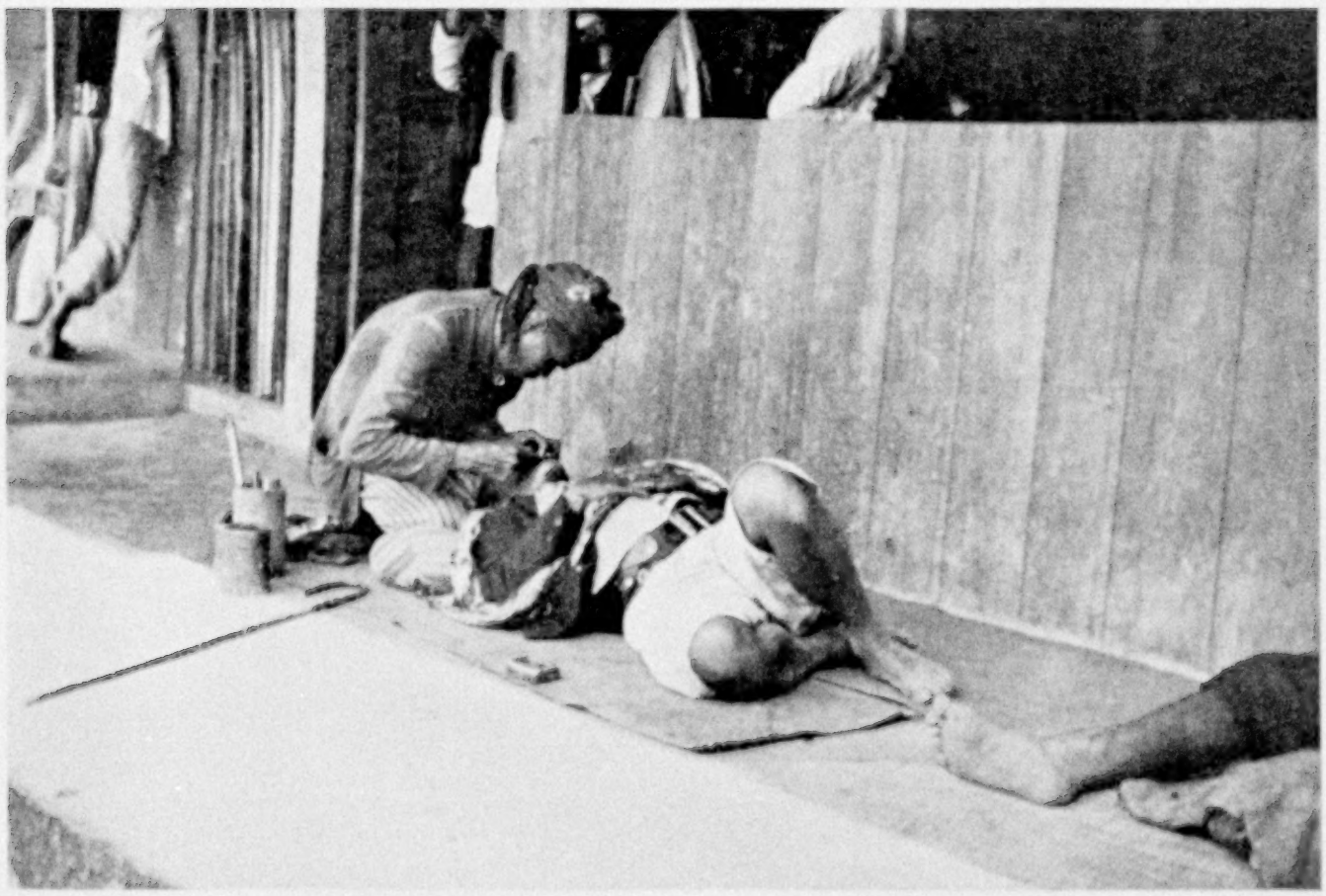
BATAKS OFTEN ADORN THEIR HOUSES WITH CARVING

Elaborate designs cut with primitive tools and painted red and black completely cover the outside walls of this building. The work shows remarkable detail, though it is somewhat inferior to that done by the Menangkabaus (see text, page 219). The girls in the middle foreground are working at a loom.

Photograph from Fredericka Broeder

GRACEFUL BOATS PLY THE WATERS OF LAKE SINGKARAK

Built like canoes, with outriggers for rough sailing, these slender craft are capable of remarkable speed. The scene has the charm of Switzerland under tropic skies.



Photograph by Raymond L. Archer

FOR FASHION'S SAKE THE BATAK ENDURES TORTURE

It is still the custom for young men and women of the tribes near Toba Lake to have their teeth chipped off, often to the level of the gums (see text, page 219). With equipment consisting of a mallet, chisels, files, and a saw made by notching a steel clock spring, the "dentist" performs the operation for a few cents.

clined trail and drew up at the village of Balige.

Lake Toba, at an elevation of 2,900 feet above sea level, covers an area of about 780 square miles. It is encircled by high table-lands and mountains, with the inhabited island of Samosir, some 27 miles long and 13 miles wide, rising out of the center (see, also, page 220).

Balige is a village of Toba Bataks at the southern end of the lake. It is a collection of strangely carved wood and bamboo houses built around a large market square. We found a group of dark-skinned Batak men squatting in the shade of the long, covered stalls, while the women bartered over their vegetables. Some of the wrinkled veterans had, no doubt, tasted the flesh of their fathers or enemies, partly cooked with a dash of lemon, as that is the way I am told they ate it. Certainly, several of them looked equal to it.

The eating of the aged is thought to have been based on a vague conception of immortality. The aged man's body would thus become part of the strong brown bodies around him, and the wisdom of the wise and experienced would also be passed on to their successors, while the fallen warriors would give of their strength and bravery. Apparently, then, both the eaten and the eaters—except, of course, the unfortunate enemy or captive—seem to have favored the arrangement in most cases.

DOG MEAT IS IN GREAT DEMAND

Dog meat finds a popular sale in the bazaars, to satisfy the queer appetites of the Bataks, and on all large market days the meat stalls are heaped with both the cooked and raw flesh. But we missed the large weekly passar, so I saw none of it at Balige. Several Fidos were wandering happily about and seemed to be in no immediate danger of their lives.

"You know, the Bataks also have their pets," said a missionary lady, when I humorously pointed out the apparent inconsistency.

There are several tribes of Bataks in the regions surrounding Toba, and the customs and dress vary according to the tribe. Some of the Bataks have been converted to Christianity, others have become nominally Mohammedans, yet a majority of them still cling to their ancient religious beliefs and animistic practices.

From Balige we climbed to the uplands again and later dropped down between flooded rice terraces to Pĕrapat, a delightful health resort, located on a long spit of land extending out into Toba. The view from the near-by mountains, showing the rice terraces in the foreground, the red cottage roofs dotting the green headland jutting into the intense blue waters, and the purple-tinged cliffs of Samosir Island rising in the distance, cannot be surpassed for beauty in any land (see Color Plate IV).

With the cool, temperate climate, the advantages of fresh-water bathing, canoe sailing, and luscious strawberries and cream—— But you must visit Pĕrapat.

On the shore of the lake I found some Batak fishermen hanging their dragnets out to dry after catching a supply of golden carp, such as those on sale in the Fort de Kock market (see Color Plates XIV and XVI). Both Sumatra and Java seem to have an abundance of these golden fish.

At some of the homes women were knotting new fishnets or were weaving scarfs and sarongs on primitive looms (see Color Plate XIV).

From Pĕrapat we motored to Pĕmatang Siantar, the center of many large tea and rubber plantations, and then curved back again past the upper end of Toba, skirting the tiny village of Haranggaol, and sped on to Brastagi, on the Karo Plateau.

We arrived on a Saturday forenoon. Again it was market day! Thousands of Karo Bataks thronged the passar, purchasing vegetables, spices, fruits, and cloths. The colors of the Bataks are not so vivid as those in the Padang Highlands, most of the costumes being indigo-dyed homespuns. Instead of the brilliant scarfs of the Menangkabau women, the Karo Bataks wear peculiarly folded turbans which resemble thick blue pillows (see Color Plates III and V). Some of the women, however, wear bright purple and blue blouses of figured silk; so even in a Batak bazaar there is plenty of color to record, if only one can get it.

But never have I seen people more mercenary than those in the Brastagi market. Everyone wanted from one to five

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GAILY CLAD WOMEN BRING THEIR FARM PRODUCE TO MARKET

On Wednesdays and Saturdays all roads to Fort de Kock are bright with crowds of feminine traders trudging along with baskets of fruits and vegetables on their heads. Despite their finery they are exceedingly shy, and considerable persuasion is necessary to induce them to pose for pictures.

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SUMATRA IS SEEN IN ITS LOVELIEST ASPECT AT KARBOUWENGAT

Ages ago a mighty river dashing down from Mount Marapi formed a deep lake near the place where Fort de Kock now stands. The water later found its way to the sea, leaving the beautiful Water Buffalo Gorge with only a shallow stream at the bottom. To-day the floor of the valley is rich in rice fields, and the walls are clothed in a bewildering array of tropical vegetation (see also opposite page).

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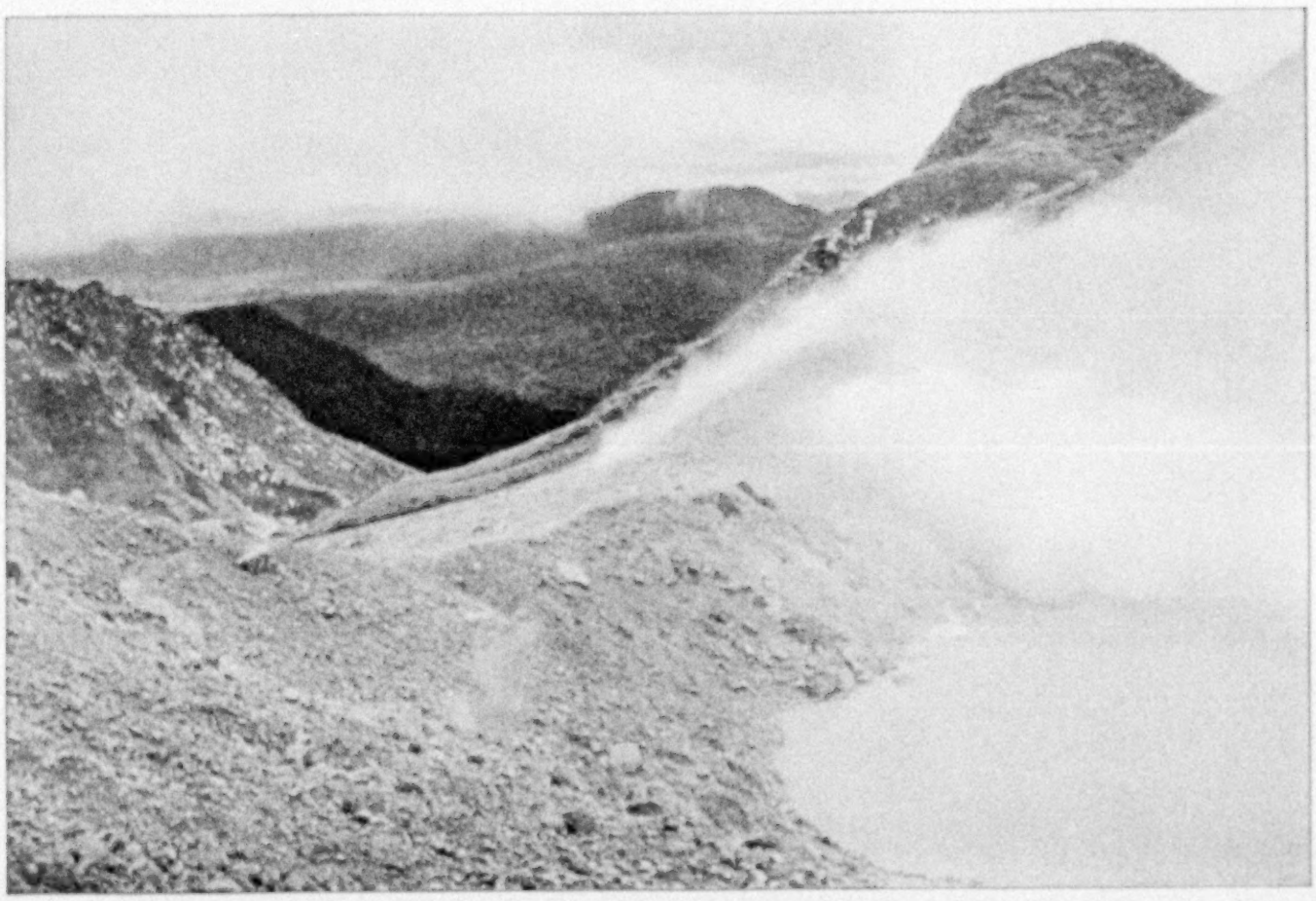
SHEER WALLS OF ERODED SANDSTONE SHUT IN WATER BUFFALO GORGE

Above the pleasant rice fields on the floor of the Karbouwengat, colorful cliffs tower to a height of nearly 400 feet at some points. By narrow, winding paths the upland native women carry their produce down into the valley on their way to the Fort de Kock market.



SIBAJAK CONSTANTLY BREATHES CLOUDS OF STEAM

Natives from Brastagi near by climb to the crater of this volcano to collect pure sulphur which has gathered on the rocks and in the lake at the right. The fumes issuing from the fissures quickly tarnish every bit of silver carried by visitors.

© National Geographic Society Autochromes by W. Robert Moore

MALAY BOYS HAVE PETS OF PRACTICAL VALUE

When the monkey playmate of these four lads from Sibolga grows up, he will be trained to pick coconuts and other high-hanging tree products. Amazing intelligence is shown by these little animals; they are taught to gather only the fruits desired by their masters.

SUMATRAN TOBACCO IS GROWN ON EXTENSIVE EUROPEAN-OWNED ESTATES

This plantation, the largest on the island, has 80 great drying sheds such as the one seen in the background. The proprietors import many Chinese and Javanese laborers in addition to the natives they employ.

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THRIFTY CHINESE PROSPER AMONG THE TOBACCO WORKERS

In Sumatra, as elsewhere in the Orient, laborers from China grow wealthy where natives can earn only a fair livelihood. They are the canniest people of the East. The man is holding the large rack which he uses to carry the newly picked leaves to the drying shed.

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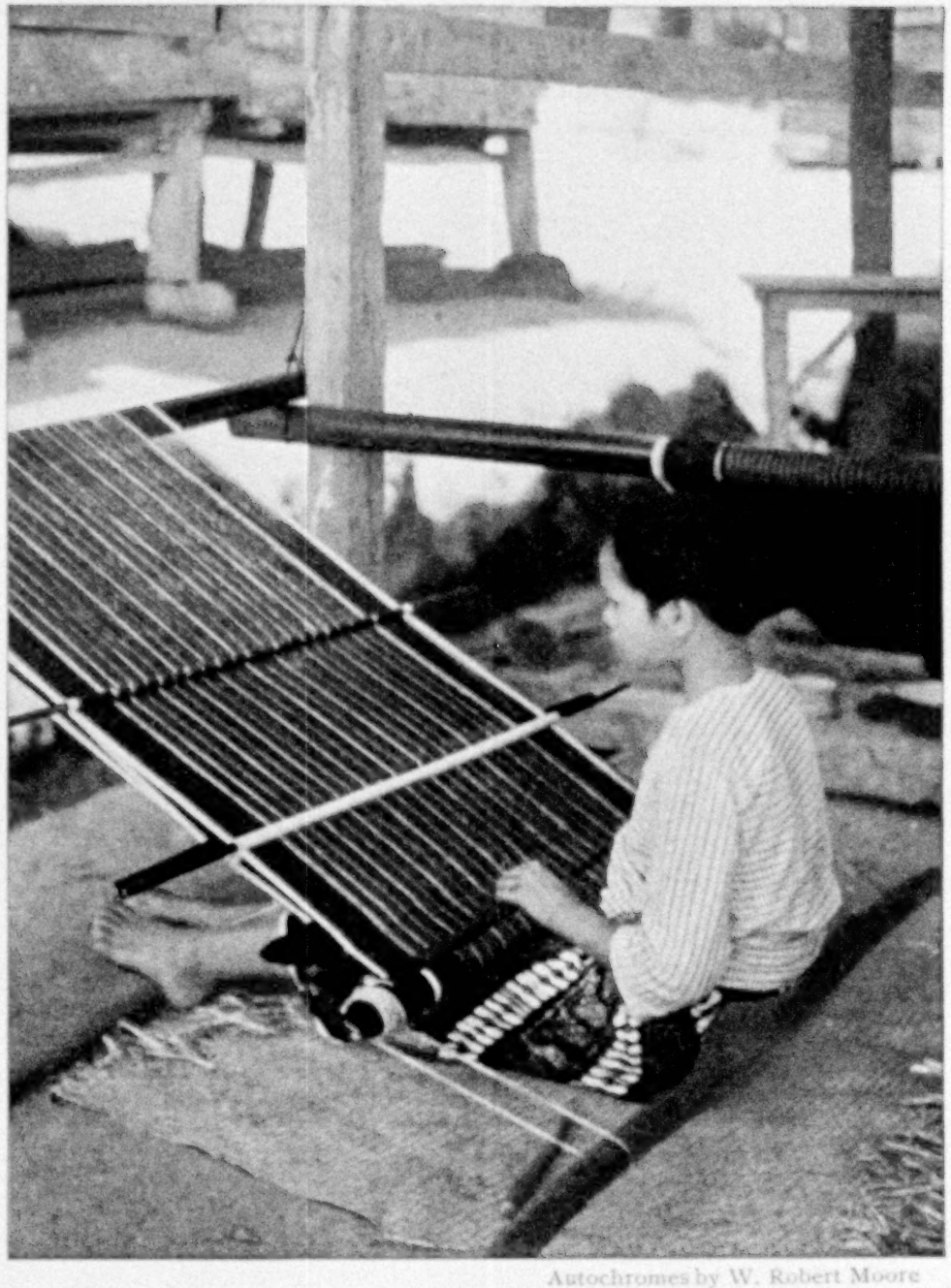
TOBA LAKE TEEMS WITH GOLDEN CARP

Native fishermen go out in fleets of canoes strung together by long lines from which dangle large white leaves. The waving shadows frighten the fish toward the lotus-spangled shallows near the shore and into matting nets hung on circles of stakes.



Autochromes by W. Robert Moore

BATAK WOMEN WEAVE PRETTY PATTERNS IN HOMESPUN

Sitting on a grass mat spread on the ground in the space beneath the floor of her house, this girl works industriously at her primitive hand loom. She has spun and dyed the thread which she is using. Indigo, which grows abundantly near Toba Lake, furnishes the blue color.

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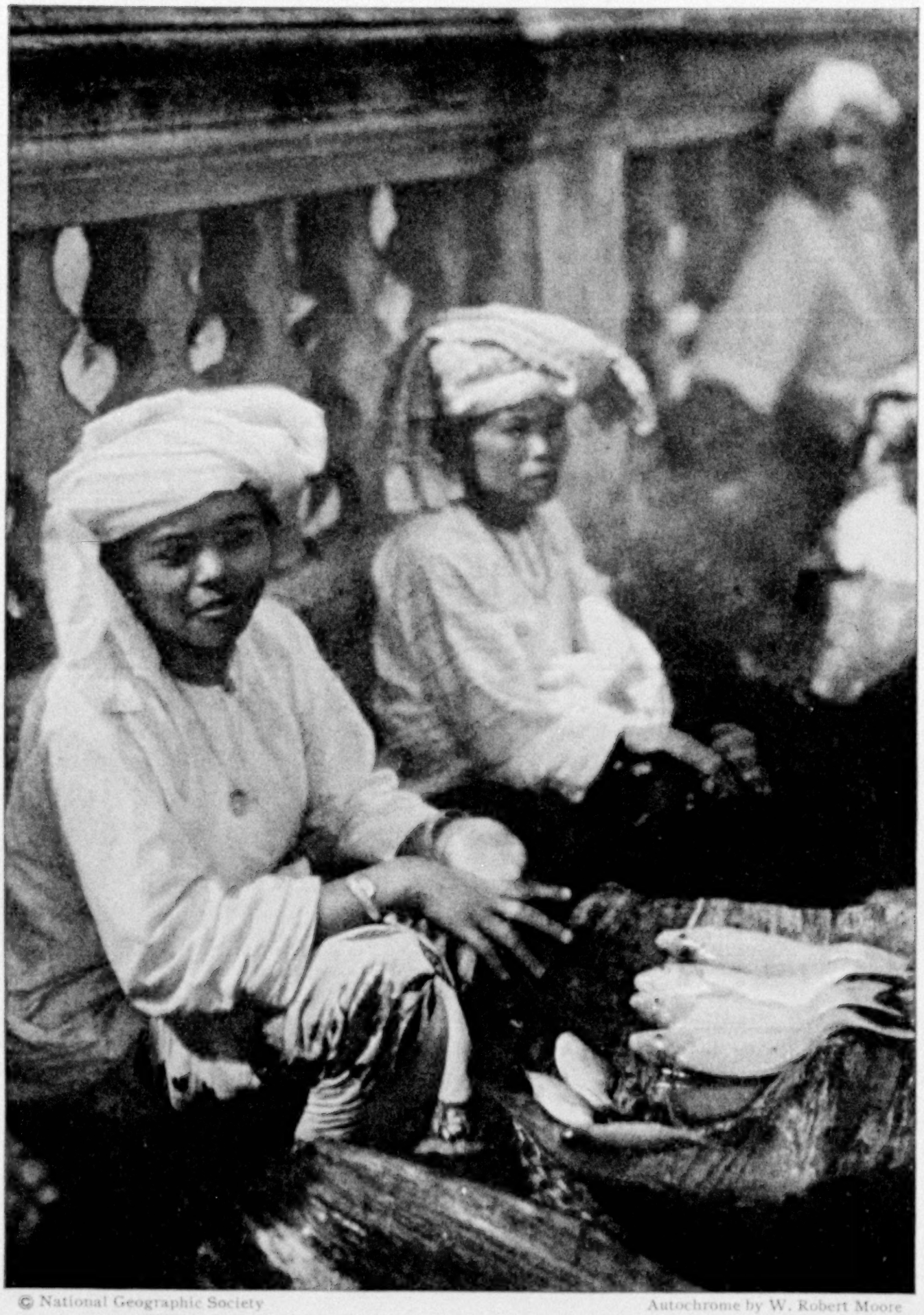
Autochromes by W. Robert Moore

YOUNG GIRLS TAKE PART IN THE MARKETING AT FORT DE KOCK

The maiden with the basket of cabbages on her head has toiled down from the Padang highlands with her produce. Dressed in her finest, the other is prepared to enjoy the holiday, but she is rather suspicious of the camera. It is noteworthy at these markets that the men are little in evidence. Femimsm triumphs here.



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EVEN THE FISHWIVES' WARES ARE COLORFUL AND ATTRACTIVE

Goldfish of huge size are found in lakes of Sumatra. One traveler describes a private pool in which gleaming carp were so numerous that birds alighted on their backs. These women have brought an early morning catch to sell at Fort de Kock.

guilders to pose for his picture. An old villager, carrying a fine staff with the typical Batak horse and rider carved on it and with the top tufted with feathers, halted before my camera while I exposed a film; but when I handed him a sufficient tip he sniffed in derision and handed it to his little grandson who accompanied him.

In the near-by village of Kabandjahe, where I photographed some of the finest examples of multi-gabled buildings to be found in all Batak land, the small boys were extremely saucy until I let them look into the focusing screen of my reflex camera and allowed the leaders to take a few snaps themselves. It was a new trick for them, and their impudence melted immediately. In fact, the boys helped expose several excellent films of a dozen shy women at work in the community rice-pounding shed.

GABLED HOMES HANDSOMELY DECORATED

The houses of Kabandjahe are unique in construction. All are raised on stilts a few feet above the ground, and the flaring sides are covered with tall double-decked roofs of heavy thatch. The chief houses are also crowned with several oddly shaped cupolas. The ridgepoles and the corners of the cupolas terminate in white modeled heads, which form the mounting for sets of horns. The number of pairs of horns indicates the bullocks or buffaloes sacrificed at the building of the structure (see Color Plate VI).

Most of the out-thrust gables of the houses and cupolas contain beautifully designed patterns in woven bamboo painted in various colors. The cupolas are further surmounted by queer carved figures exactly like that on the staff of the old man in the Brastagi market (see, also, page 193).

Besides the great communal houses and the lesser buildings, the villages contain several gorgeously carved and colored dovecotes, court buildings, and pavilioned tombs, which are modeled after the most elaborate cupolas.

The women clung to the shadowed verandas or peeped from the dark recesses of the houses and would not venture to expose themselves before my "infernal black box." A number of them wore heavy coiled-silver earrings. The rings are worn so that one points forward and the other backward, and they are so heavy that the weight has to be partly supported by the corners of their blue turbans.

THE NATIVE DENTIST WIELDS CHISEL AND MALLET

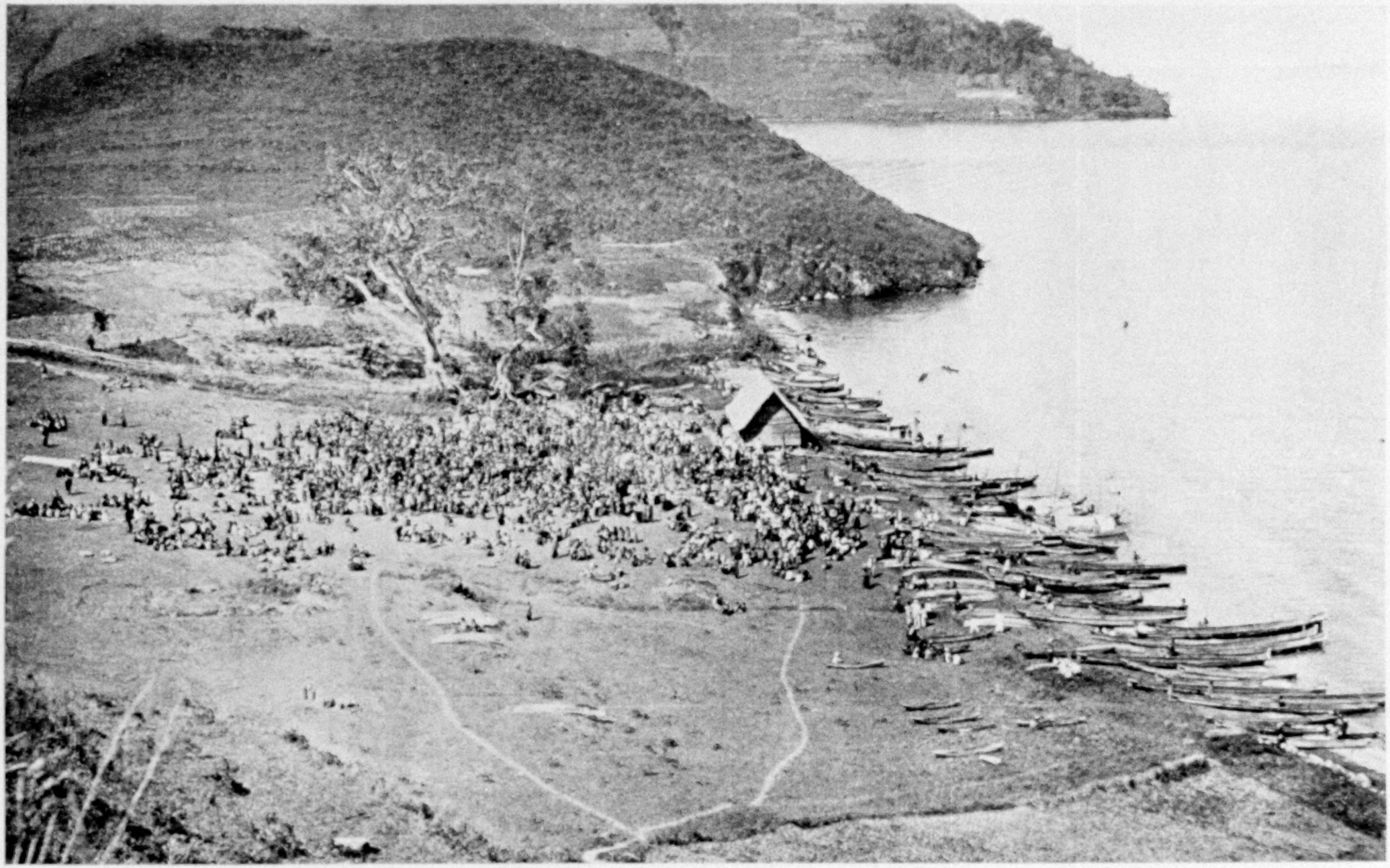
Practically all of the Bataks file the teeth upon reaching maturity. With a great many the teeth are chipped off to the level of the gums. Presumably the practice enhances beauty to Batak eyes. The unsightliness of the mouth, in Western eyes, is further emphasized by the chewing of quantities of blood-red betel nut.

In the open market places the native dentist does his work, with the patient lying at full length on his back on the ground. A mallet and chisels, a file, and a small saw are his implements; with these he chips and files the teeth down. But what excruciating pain the victim must endure! The teeth are shortened for only a few cents each (see page 209).

Notching the skyline in several directions from Brastagi are active volcanoes. Smoldering Sibajak is the nearest. So one morning, accompanied by a young guide, we shouldered our heavy cameras and climbed up the most direct, though tortuous, trail to the smoking crater. The jagged hollow in the mountain top was full of hissing, sulphur-encrusted fumaroles, boiling mud pots, and in the bottom was cupped a warm, milky sulphur lake. While we worked in the crater, photographing the fumaroles as they ejected whistling steam, all the metal work on our cameras and the silver coins in our pockets became badly tarnished by the pungent vapors. Several natives were collecting bags of sulphur and carrying them down to the plains to sell (see page 208).

The next day we obtained motor transport and hurried down 45 miles from the invigorating climate that we had been experiencing at the 4,700-foot altitude of the Karo Plateau, through acres of rubber, oil-palm, and tobacco estates, to the low, hot plain, and arrived perspiring in sultry Medan.

Many planters, in the great rubber boom, cut down their oil-palm groves and planted rubber trees. The plains surrounding Medan, however, have been most noted for their tobacco plantations. The



Photograph by E. Hagerup

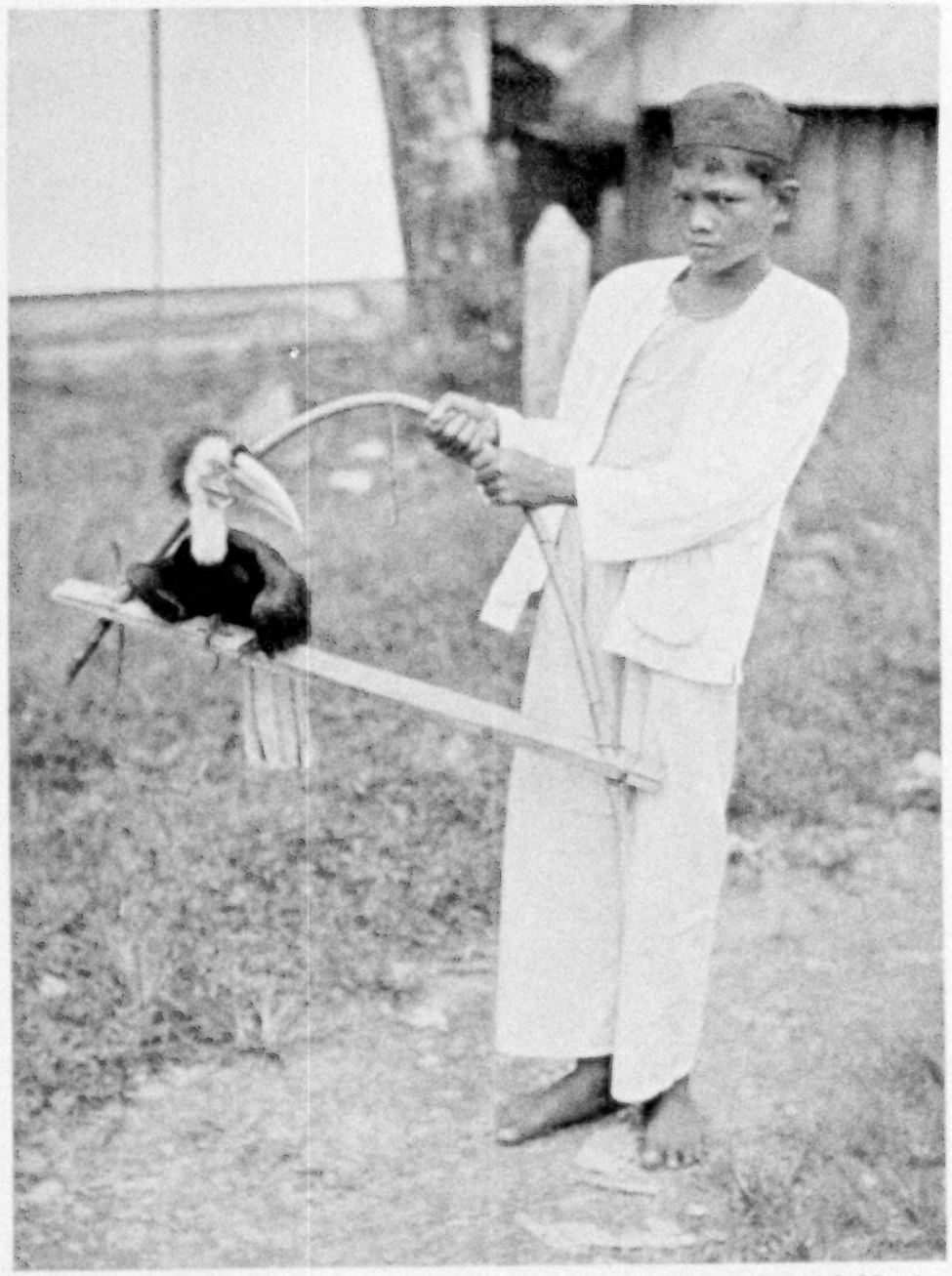
TOBA LAKE NATIVES ENJOY A WEEKLY FAIR

Although this wild region has no market town such as Fort de Kock, the people gather every Saturday morning at a sort of picnic ground, known as Tika Radja, to barter their produce, exchange news, and perhaps arrange for marriages. Most of them come to the meeting place in canoes, paddling in from Samosir or from distant points along the shore (see, also, text, page 210.)

Photograph courtesy U. S. Department of Agriculture

PICKABACK TRANSPORT

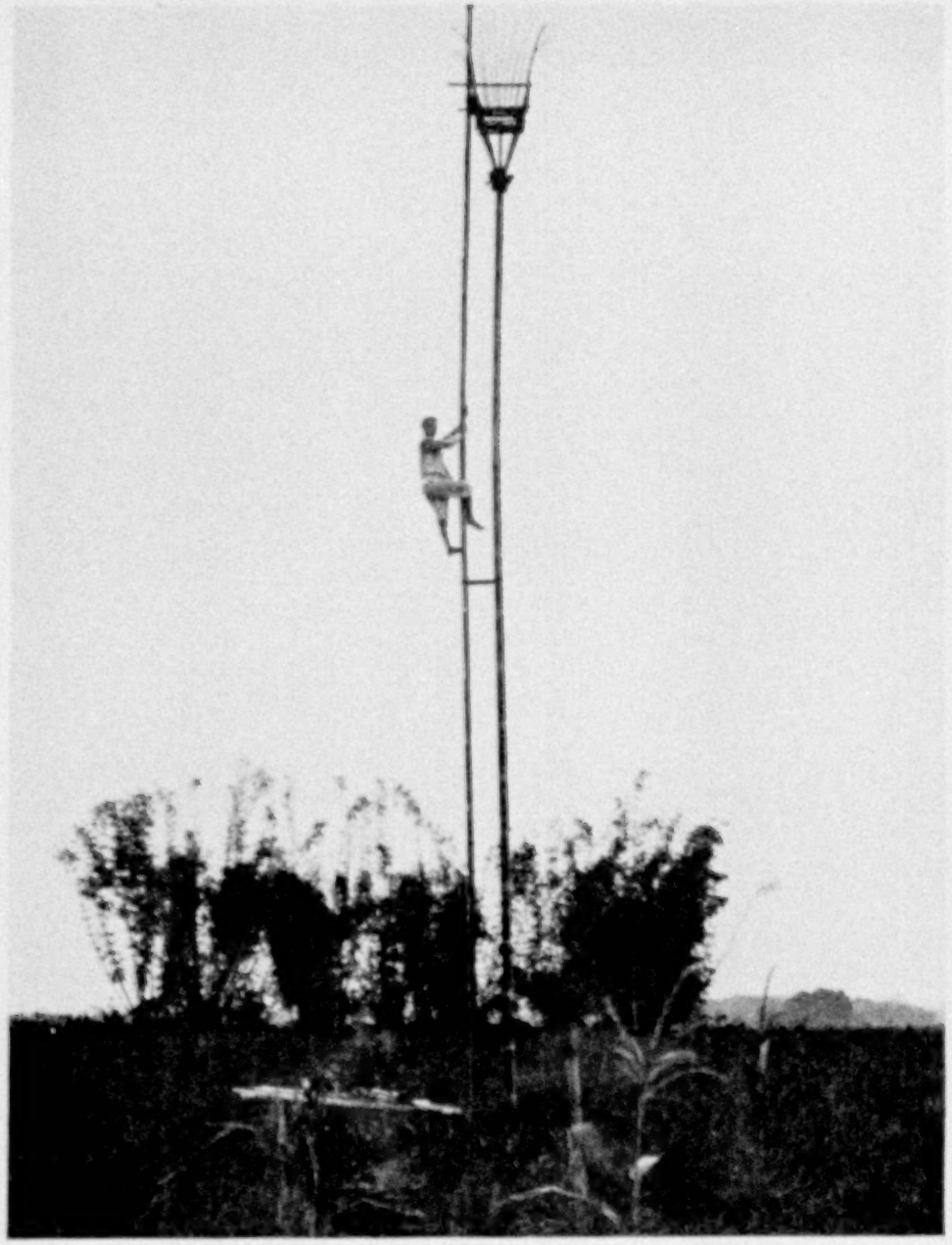
Dutch soldiers' wives often journey in this manner to the otherwise inaccessible interior posts where their husbands are stationed.



Photograph by David J. Martin

PET AND PERCH MAY BE BOUGHT FOR A DOLLAR

The scientific name of this ungainly specimen of the hornbill family is *Cranorrhinus corrugatus.* Tame birds are prized throughout Sumatra.



Photograph courtesy U. S. Department of Agriculture

THE SUMATRAN SCARECROW IS AN AMAZING DEVICE

To frighten birds from his growing rice, the highland farmer climbs the notched pole ladder, and with hoots and yells shakes the rattan strings stretched to the extremities of the field from the flexible uprights.

Photograph from W. Robert Moore

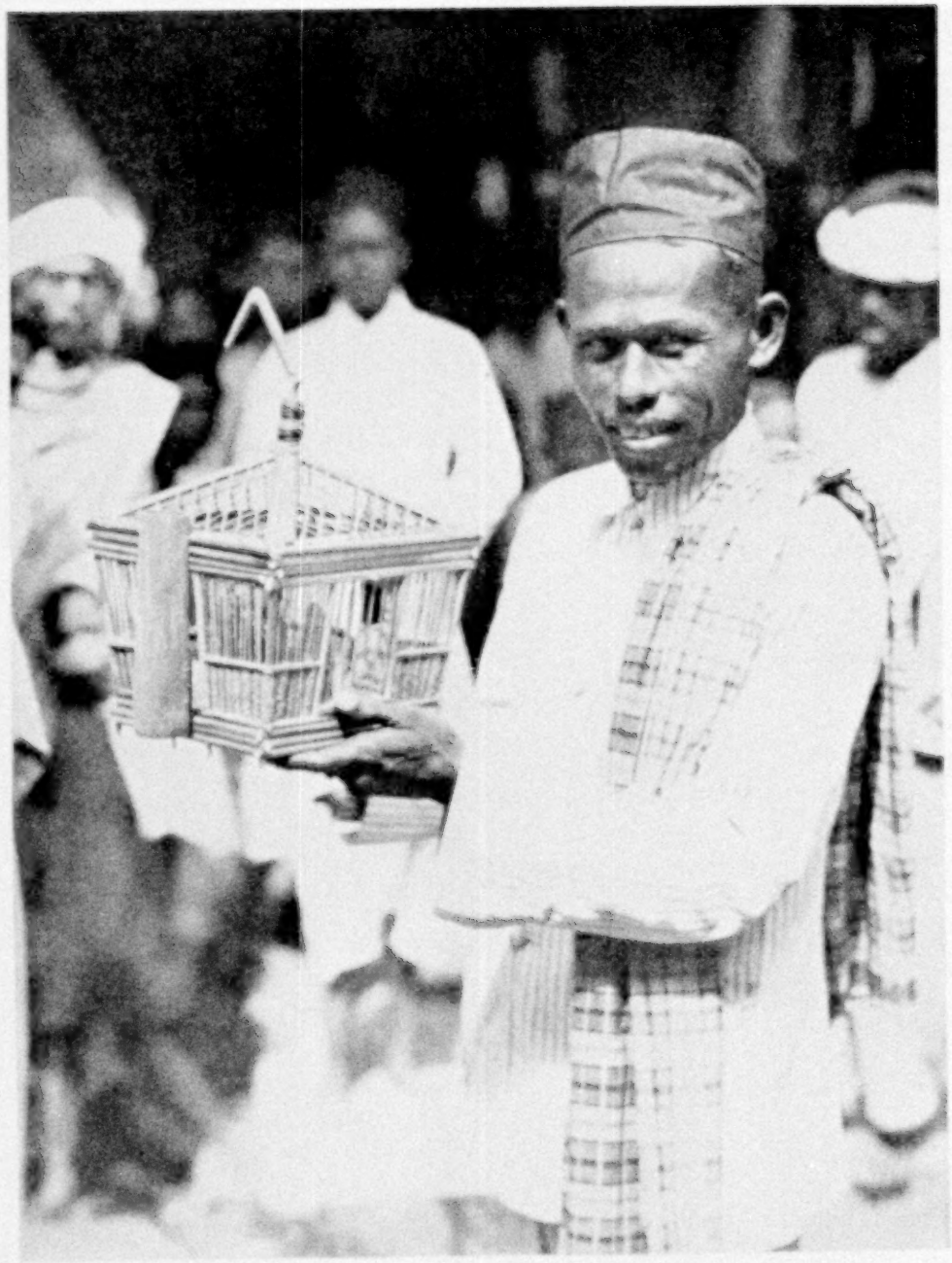
WATERFALLS ABOUND NORTH OF TOBA LAKE

This wild region is a high plateau cut by deep gorges, into which numerous streams plunge in gleaming cascades. The scenery is similar to that found in the western part of the United States.

Photograph courtesy U. S. Department of Agriculture

CLIMBING A SINGLE-POLE LADDER REQUIRES AGILITY

The steps are mere notches, barely deep enough for the toes, yet the native easily mounts to his perch on top of the scarecrow (see page 222).



Photograph by W. Robert Moore

THE SUMATRAN NATIVE DELIGHTS IN A PET BIRD

The intricately woven cage is provided with a wooden hook by which it can be suspended from a pole near the owner's house (see, also, illustration, page 221).

EXTENSIVE OIL FIELDS HAVE BEEN DEVELOPED IN NORTH SUMATRA: WELLS AT PANGKALAN SOESOE, 45 MILES ABOVE MEDAN

Photographs by Alice Schalek

OIL TO BE EXPORTED IS STORED IN SMALL TANKS FOR EASE IN HANDLING

Photograph by Alice Schalek

A SUMATRA RUBBER PLANTATION

Though the industry has not been fully developed, it is advancing rapidly under the direction of a Government experiment station at Medan. Coffee is usually grown among the rubber trees until the latter are large enough to yield gum, and then the ground about them is cleared.

Photograph by Alice Schalek

LABORERS ON THE TEA PLANTATIONS ARE MOSTLY WOMEN

In enormous hampers these workers carry to the packing houses the product of their day's toil.

largest and oldest tobacco company annually ships to Europe more than 500 tons of the best quality Deli leaves, which are widely used as wrappers in cigar-making. This company employs some 40,000 Javanese, Tamil, and Chinese men and women laborers, who are supervised by a large staff of foreign managers.

GOLD SEAL WORKS MAGIC

Back in Arnhemia, at the last village of the Bataks, I spent our last morning trying to make a few more autochromes of the Batak women. The village headman agreed that we might make photographs, but we could get no one to pose. We pleaded with him, but seemed to accomplish nothing. At last, with a new idea born of despair, my companion, who was carrying on the conversation in Malay, asked me if I had a letter or anything that I could show the headman. I drew out a letter bearing the shining gold seal of the National Geographic Society's certificate of membership and handed it to him.

The headman turned it sidewise, upside down, and at every angle. Of course, he could not read one word on the paper, but the seal was impressive. He nodded his head and beckoned the women to pose as I had desired. Once in the game of dressing up for her portrait, however, an old grandmother eclipsed the chief's effort in helping to arrange for the pictures.

Catching a passing bus, we hurried

Photograph by W. Robert Moore

BATAKS POUND RICE IN COMMUNITY SHEDS

Among these natives group effort is common, for the tribe is a close-knit social unit. It is not unusual for 20 or more women to work together thus. Hogs, chickens, and dogs wander at will about the village and under the houses, picking up whatever they can find to eat.

back to Medan and were soon aboard the train for Bĕlawan, where we were to embark for Penang.

The steamer slipped out from the mangrove swamps into the Malacca Strait. Not long after, as I looked back along the wash of the throbbing screw, a crimsoning, dusk-filled horizon closed over the Sumatran coast.

Thus ended our visit to the fascinating island astride the Equator, of which few travelers see anything beyond the distant smoky blue mountains, as their steamers leave the Malayan ports India-bound.

Notice of change of address of your NATIONAL GEOGRAPHIC MAGAZINE *should be received in the office of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your April number, the Society should be notified of your new address not later than March first.*

MODERN YOUTH FINDS QUAINT BACKGROUND IN ALBEROBELLO, ITALY

Pupils from a school for girls furnish a striking note of contrast, grouped along the wall and on the edge of the low roof of an old trullo, while a small boy peers down at them from a vantage point reached by agile climbing. The town of conical houses is full of surprises; many of its folk are as up-to-date as its architecture is antiquated.

THE STONE BEEHIVE HOMES OF THE ITALIAN HEEL

In Trulli-Land the Native Builds His Dwelling and Makes His Field Arable in the Same Operation

By Paul Wilstach

Author of "Holidays Among the Hill Towns of Umbria and Tuscany" and "Jefferson's Little Mountain," in the National Geographic Magazine

With Illustrations from Photographs by Luigi Pellerano

"HAVE you ever seen the trulli?" ventured a small, shy man with little gold on his cuffs but several ribbons on his left breast.

"Trulli? Trulli? What is or what are trulli?" I inquired. The word suggested gastronomic rather than geographic exploration.

We, a group of Italian naval officers and an American engaged in snooping among the more interesting historical and unusual places of the "heel" of Italy, were seated at a table of an out-of-door café in Taranto, a pleasant seaside city which enjoys the distinction of ranking second in importance among Italy's naval bases.

My newly made friends had been endeavoring to aid me in finding a field fresh for my wandering feet. One had suggested the Castle of Pulsano, with its huge stone at the top, so suspended that it could be dropped on any assailants approaching by the outside stairway running from the pavement to the highest battlements of the stronghold. Another had suggested Matera, sometimes called the Subterranean City, because a large proportion of its population lives inside the earth and two of its churches are grottoes in the rock. Still others had urged Manduria, with its so-called Well of Pliny, and beautiful Lecce, the "Florence of Lower Italy."

But with the mysterious word "trulli," all thought of other places of pilgrimage vanished.

With cascades of words and eloquent gestures, I was informed but not enlightened as to its meaning. I realized, however, that here was unhackneyed quarry for the hunt, and so I set out to seek the trulli.

They were hidden away between the obscure towns of Francavilla and Alberobello, on the edge of the billowing hills of a limestone ridge, Le Murge, which parallels the Adriatic, between two flat plains, the Tavoliere di Lecce to the south and the Tavoliere di Puglia to the north. Literally, *tavoliere* means checkerboard, and the small rectangular farms in these plains, contrasting with each other in the varying colors of the raw earth or the grain or grass or trees, sustain the figure.

SETTING OUT FOR TRULLI-LAND

Francavilla is 21 miles east of Taranto, on the railway line to Brindisi, and here a leisurely second-rate branch line meanders northwestward 35 miles through rolling country to Alberobello, and thence in the same direction to Bari (see map, p. 233).

Leaving Taranto, our train trailed eastward across green fields dripping with the blood-red of poppies; past orchards of peaches, plums, cherries, almonds, and young olives, or comparatively young olives, for the youth of any olive tree I've ever seen dates back by centuries; past grazing stretches mottled with yellow cows and black sheep; a level terrain, and rich, if the numerous well-built farm establishments signify.

The cloudless sky was blue as an inverted sea. The sunny air had the crystal translucence that it has in near-by Greece, revealing distances microscopically and bringing them in detail to the naked eye.

As far as the horizon, there were no buildings which were not white, whether detached in settings of green or massed in villages. Nowhere was a gable seen, for here the housetops are invariably flat.

WALLS OF ENORMOUS THICKNESS SEPARATE THE FIELDS

In season of vegetation these plots form a charming tapestry of contrasting hues, which make clear why some portions of this neighborhood of Italy are called *tavolieri*, or checkerboards (see, also, text, page 229, and Color Plate II).

TRULLI DOT THE COUNTRYSIDE BETWEEN MARTINA FRANCA AND LOCOROTONDO

In the two towns, however, none of the stone houses is found. Alberobello is the only city where this style of architecture prevails.

TRULLI-LAND IS A WORLD OF STONE

After the peasants have built their houses and fences, making the walls very thick to dispose of as many rocks as possible, they often have to stack the residue in huge ricks in the fields (see text, page 234).

ALBEROBELLO ROOFS FORM VALLEYS OF ROCK

The cones are built without mortar and without the use of grooved stones, yet they endure for centuries (see text, page 234).

I missed the bell towers, the campanili, those perpendicular poems in masonry that grace Italy in nearly every other sector. But, curiously, even more I missed the slender fingers of the minarets and the low, white, hemispherical domes above the Moslem bathhouses, for air and architecture here suggest Italy less than they do the neighboring Levant, whose rim is just across the narrow Adriatic.

At Francavilla I changed to another train, which took us deeper into the heart of the country. The carriages on this branch railway, reaching into the foothills of Le Murge, were mere toys for size. There were no second-class compartments and only a single one of the first class—and that was empty.

THIRD-CLASS PASSENGERS IN SOUTHERN ITALY

I cast my lot with the third class. The carriage was not sealed off into compartments, but was unobstructed for its entire length, somewhat after the democratic fashion of an American railway car. Its wide-open windows let in sun and air on its well-swept floor and its gleaming varnished benches, and revealed a simplicity and cleanliness of place and passengers which were both a surprise and an encouragement to acquaintance.

They were all neighborhood folk on short trips. There were three young girls with serene and regular faces which seemed copies out of Raphael's canvases. With them was an older woman, who wore the full woolen skirt and gayly embroidered bodice and white coif which were obviously the traditional costume of the neighborhood, and stamped her as probably a household servant sent along to chaperon the gentle *signorine*.

Across from them sat a Fascist in his black shirt and gray uniform, his Robin Hood bonnet at a rakish angle. Over one shoulder and under the other arm swung an ammunition belt, and his holster was bulging and businesslike. In his gloved hand he carried his *bastone*, not a delicate swagger-stick, but a stout cudgel that looked as if it might be "loaded." He was on some errand of righting Italy, making it safe and clean and busy, refreshed and strong. But en route, I observed, he kept his big, dark eyes wide open on the three signorine.

Others of my fellow travelers were a man with a 'cello; a boy with his shoulders draped with a garland of the tiny black oysters of Taranto for an inland feast; a swarthy peasant woman carrying a drooping fuzzy bouquet of four hares; a sailor homeward bound from completed service, with a blue plaid bundle whose contents of invisible cheese and sausage and fruit were suggested by a loaf of bread sticking out of one opening and the slender neck of his *fiasco* of wine sticking out of the other; and there was a blind fiddler feeling out new fields, no doubt, and the cheeriest man in the car, singing all the way.

At one end a young couple and their baby crowded in, but they would not have been noticeable had it not been that the infant was bound like a white cloth package, rigid and straight, with only head and hands exposed, exactly like a glazed terra-cotta bambino by a Della Robbia come to life out of the tympanum of a Tuscan church door.

Everyone was settled and the doors had all been slammed and the functionaries had begun to whistle the train on its way when, breathless but laughing, in popped a little old woman in simple peasant black,

Drawn by C. E. Riddiford

THE BASE OF THE ITALIAN BOOT HEEL IS TRULLI-LAND

"There are more trulli in the 25 miles from Francavilla to Alberobello than there are nuraghi in the entire island of Sardinia" (see text, page 234).

but running largely to umbrella. That accessory was green and it bulged like an enormous cabbage, inviting guesses as to its contents. Was it her improvisation of a market basket or of a traveling bag? One guess was as good as another, for its secret was held securely where the rib ends clustered near the handle, not with strap or string, but with good, stout wire.

EVERY COTTAGE A CONE

We soon left the checkerboard of Lecce behind and climbed into the rolling country of the Murgian hills. Within a few miles the whole aspect of life and Nature changed.

My first sense of this change was when the brown soil became delicately flecked with white, the first outcroppings of these limestone ridges. Gradually the stones increased in size and number, and with this

increase the efforts of the peasants to dispose of them came into evidence with the low, loosely piled walls which began to line the landscape.

Mile by mile the walls increased in breadth and height to a size ridiculously beyond what was practical as a barrier, tapering slightly from a 5- or 6-foot base and rising 4 or 5 feet high. As they increased in size they grew in number, making the fields smaller and smaller (see illustration, page 230).

Though there was more and more stone in these fences, scarcely less seemed to remain in the ever white-flecked soil, which nevertheless supported grain and vines and fruit trees. No less astonishing results of the effort to rid the soil of stone were the great cubical ricks of them which rose in the middle of some fields.

PROBABLY THE WORLD'S MOST ECONOMICAL HOMES

And then, suddenly, I had my first glimpse of the trulli—strange cottages with high conical roofs rising like pointed domes above low perpendicular side walls.

From the trulli near the car window I saw that they were built of small flat slabs or slates of field limestone, and later learned that the construction is invariably "dry"—that is, without mortar or cement to hold the stones together. This self-supporting, dry-constructed conical roof is one of the wonders of stone masonry, and its like is probably not to be found anywhere else (see page 232).

It is small wonder that I came upon the trulli with surprise. Science is dubious about them and so keeps a cautious tongue. I tried to find even a single map that mentioned the region. The guidebooks treat it cavalierly—that is to say, they snub it. Since finding it I have made a game of asking tourist agents about it, and haven't yet failed to draw a blank. Singularly, even the Italians there, at the foot of Italy, round about trulli-land, know little or say little of it; and in other parts of their peninsula, as well as in the wider world of which their peninsula is a part, the Region of the Trulli is as little known as are its unique habitations.

I do not know where, in the entire civilized world, one will find more economical houses. The material costs the builder nothing. He is not even at the expense of carting, since he finds the stones on the spot where he builds. The stones are used in the flat, irregular form in which they crop out of the soil, so there is no cost for working up the material.

The farmer by gathering up this material for his house helps to clear his lands, and so places more soil at his disposition for cultivation. Moreover, construction costs nothing but time, for each farmer builds his own trullo without the expense of architect or mason. Finally, it is a building which seems to stand indefinitely, with a minimum of renewal or repair.

As long as I was in the region of the trulli I searched the landscape for houses which were not trulli. There were no others. In every direction I saw only their quaint conical roofs. And, by one of the curiosities of structural custom here, one may, even at a distance, tell at a glance of how many rooms each house consists; for if it have more than one room, then each additional room has its own conical roof.

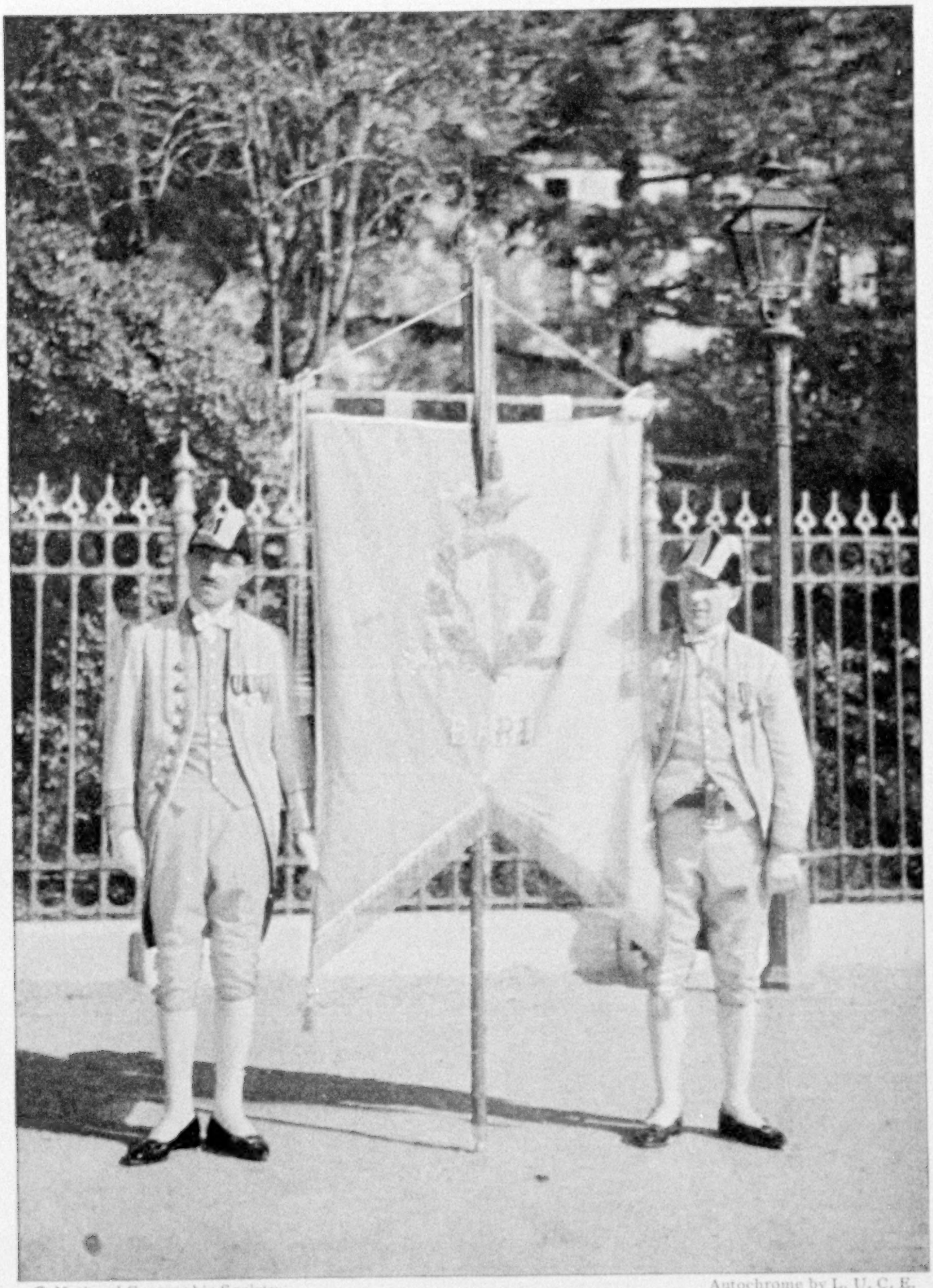
The trullo with one cone may represent a storehouse, or an animal shelter, or the dwelling of one of the poorest *contadini* (country folk). According to the means of the builder or the increasing size of his family, as he adds rooms he adds a cone above each of them; so that larger trulli present a family group of two or three or four, or even of seven or eight, cones in each domestic unit.

"A WORLD OF PETRIFIED HAYSTACKS"

These houses make an instant appeal to the imagination. From the train, I found it difficult to isolate a single specimen, for they are everywhere about, as far as the eye can see. In the little commune of Martina Franca alone there are nearly 2,000 trulli. There are more trulli in the 25 miles from Francavilla to Alberobello, the extent of the *Plaga dei Trulli* (Region of the Trulli), than there are nuraghi in the entire island of Sardinia.*

As I looked out upon the bewildering

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Little-Known Sardinia," by Helen Dunstan Wright, August, 1916, and "The Island of Sardinia and its People," by Prof. Guido Costa, January, 1923.



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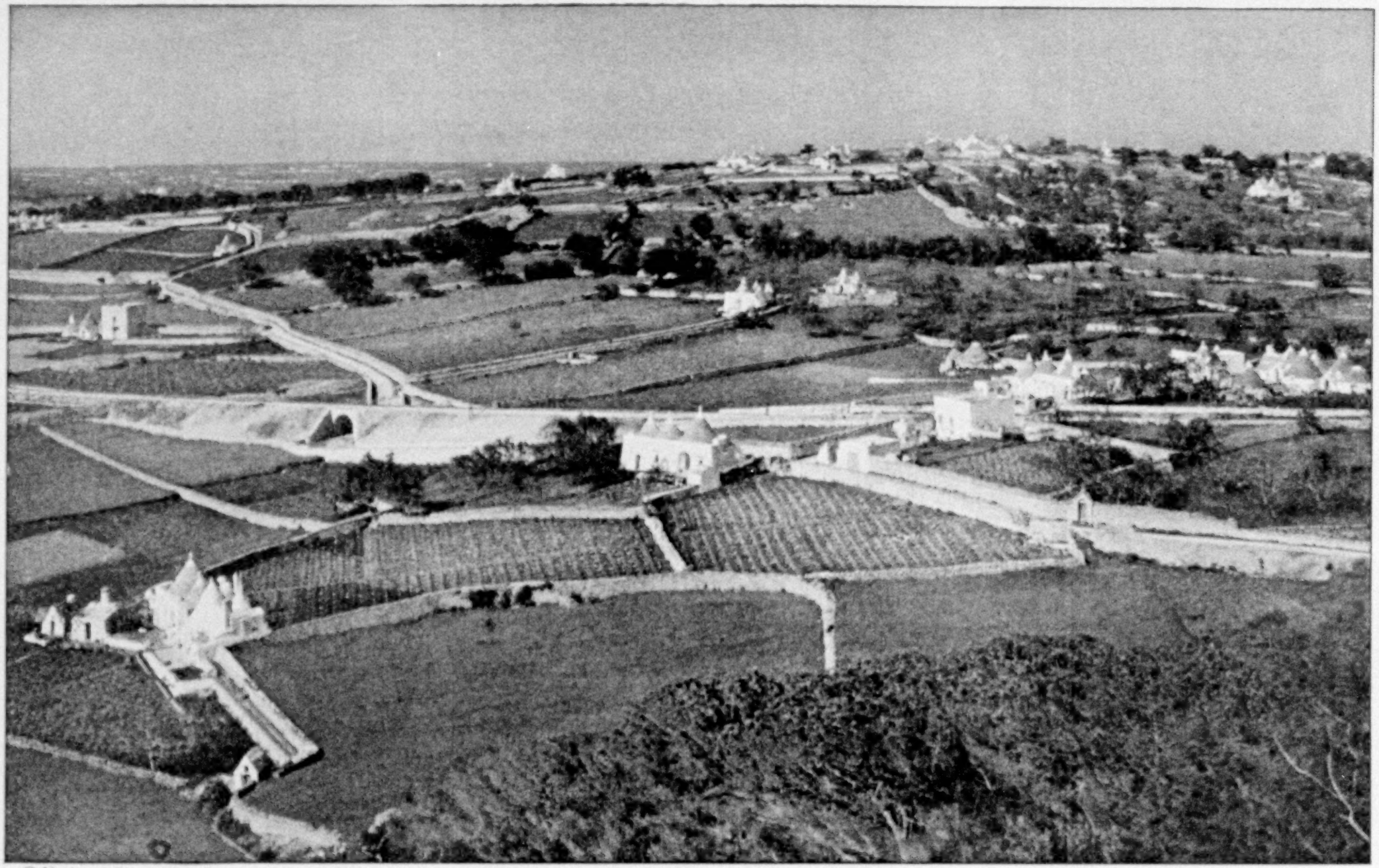
COSTUMES OF 1700 GRACE GALA DAYS IN BARI

For state occasions serving folk of each old house have their distinctive traditional garb. These uniformed *valletti* are guards of the banner of the commune.



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Autochrome by Luigi Pellerano

FARMS NEAR LOCORONTONDO AFFORD NATURAL SETTINGS FOR TRULLI

By building his queer, conical-roofed house of stones cleared from his land, the thrifty peasant achieves a double triumph of economy. Fences around the fields are erected less as barriers than as means of disposing of the soil-cluttering rocks.

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FOGGIA RETAINS SOME MEMORIES OF ITS PAST

Though this bustling railroad center is one of the most modern cities of Italy, it brings out costumes of 1700 at times of festival. It was founded in the days of ancient Rome by people of ruined Arpi and derived its name from the *foveae*, or trenches for storing corn.

Autochromes by L. U. C. E.

QUILTED SHAWLS ARE TREASURED IN BARI PROVINCE

Elaborate handmade costumes with headdresses and shoulder coverings of silk were the pride of women in the district around Alberobello in the early part of the 19th century, but few of them survive to-day save as keepsakes. Here, as elsewhere in Italy, needlework is a fine art.

FOLIAGE GROWS ON THE TOPS OF OLD TRULLI

When the winds deposit soil and seeds in the interstices among the mortarless stones, the householder acquires a ready-made roof garden. Walls are calcimined once a year. This is a characteristic farm near Alberobello.

© National Geographic Society Autochromes by Luigi Pellerano

SKILL AT POTTERY SEEMS INSTINCTIVE WITH ITALIANS

In the Trulli country the fashioning of earthenware vessels is a flourishing industry. Many of the designs are strikingly original and artistic. Unglazed jugs, such as the large white one in the right foreground, are used as water coolers in this hot, dry climate.

STONE BEEHIVE HOMES OF ITALIAN PEASANTS

FOGGIA GIRLS WITH OLD-TIME CAPS NEED NO PARASOLS

Costumes like these, though rarely seen to-day, were common in southern Italy up to 1900. In the last century such spotless white headdresses and colorful aprons were a part of every bride's trousseau.

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Autochromes by L. U. C. E.

FASHIONS FOUR CENTURIES OLD ARE NOT FORGOTTEN IN BARI

Southern Italian peasant women are famous for their needlework. Until recently they not only made all their own clothing by hand from fabrics spun and woven at home, but did all the weaving and tailoring for their menfolk.

© National Geographic Society

Autochrome by Luigi Pellerano

THE TRULLI ZONE OF ALBEROBELLO HAS BEEN MADE A NATIONAL MONUMENT

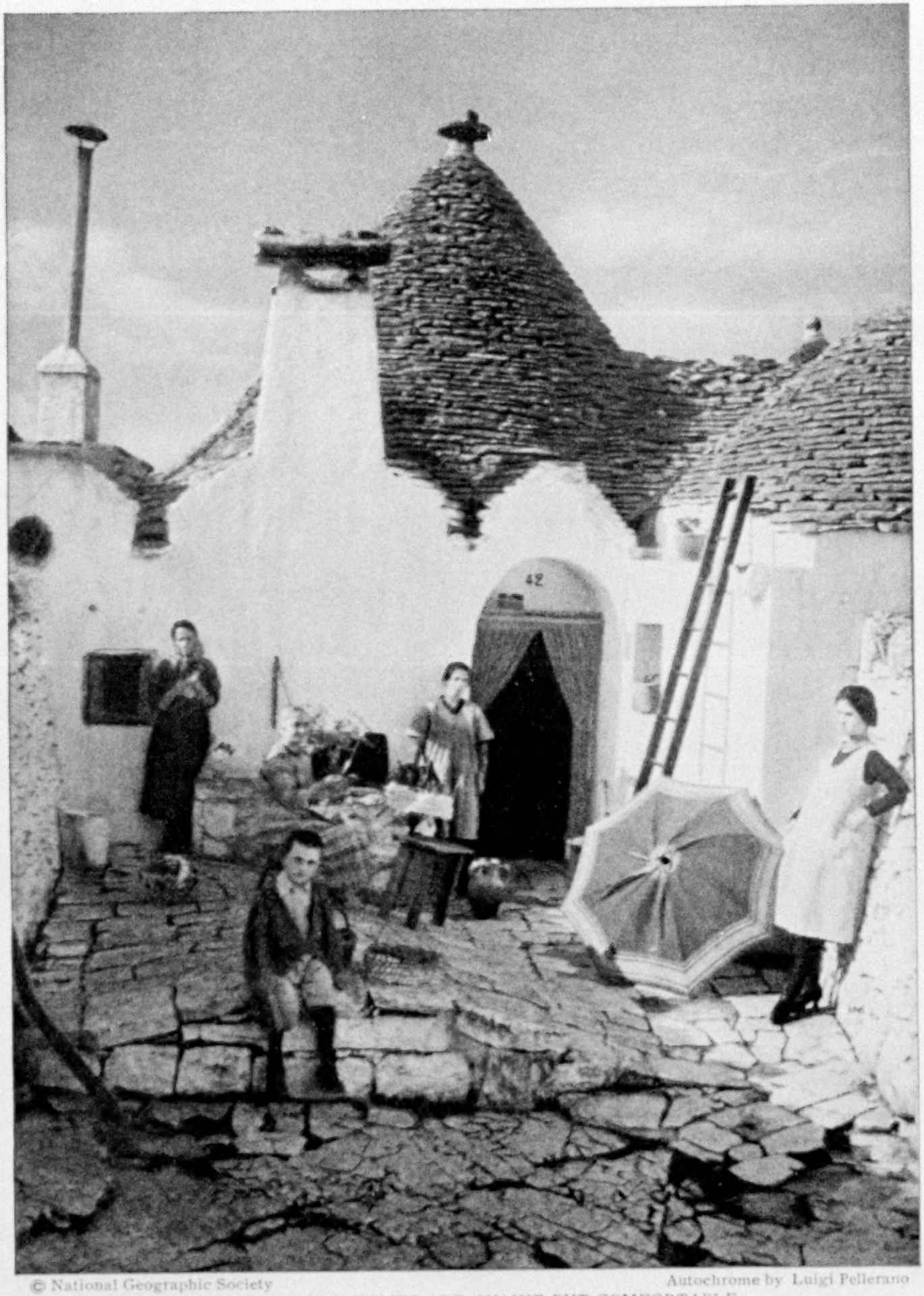
In this village is found the largest collection of "stone haystack" houses in Italy. The encroachment of modern structures, however, has spoiled their effect somewhat. They look more attractive in the country landscape.

© National Geographic Society

Autochromes by L. U. C. E.

ELABORATE PEASANT COSTUMES ARE COMMON IN RURAL DISTRICTS

The women with striking hand-woven shoulder wraps are from the commune of Ravino di Puglia, Province of Bari. Their neighbors are a shepherd and his wife, who live in town because of the scarcity of water in the country. The husband goes out daily to drive his herd over the barren fields.



© National Geographic Society Autochrome by Luigi Pellerano

ALBEROBELLO HOMES ARE QUAINT BUT COMFORTABLE

Walls of great thickness make the trullo cool in summer and warm in winter. The greatest difficulty is in the problem of illumination and ventilation, but there is always room in the flagged court for family work that requires more light than the tiny windows let indoors.

multitude of the strange cottages, a cone or a group of cones every few hundred feet, in all directions, for miles and miles, the effect was to me without parallel. It suggested not only a world of queer prehistoric tombs, or giant beehives, or Titanic candle-snuffers, but a world of petrified haystacks, or a vast military camp of ancient Roman tents, abandoned and turned to stone. I could scarcely tell whether the effect was elfin or Gargantuan, but it was wholly unreal and indescribably fascinating. It might have been the phantasy of an illustrator of a fairy story come to life.

When our train came to the hill town of Martina Franca and others, I looked up at horizontal roof lines and realized that, though there are trulli exclusively in the landscape of the country, there is not a single trullo in the make-up of the towns of trulli-land, until one reaches a single town, even farther north, which is the unique exception, at the district's end.

I descended from the train at Martina Franca and, with five others, took a place in the only carryall in the town, drawn by the only horse in the town, as far as I saw. The conveyance might have held four normally, including the fat driver, if the passengers were sufficiently slim.

The horse was a model of slavish endurance over a long mile that rose sharply all the way to the town proper, on the apex of the hill, where, in more warlike and predatory ages, Martina Franca was better able to maintain the independence reflected in its name.

AN AUTHORITY ON TRULLI ACTS AS THE AUTHOR'S GUIDE

This remote little city harbors a population of more than 20,000. Under its coating of whitewash it might pass for a huge monolith of chalk sculptured into architectural forms. Coming out of a world of trulli cones, where one is conscious of curves only and not at all of angles, when the first houses of the town shut out the green country landscape, I was for a moment startled to find myself in a wholly white world of straight lines and angles only, a world entirely without curves and where every roof is flat.

To ask any question about the trulli in Martina Franca produces instant reference to Prof. Giuseppe Grassi, the regional historian, and any such questions asked of him act as a key to his enthusiastic aid.

Whatever may be his occupation at other times, as long as I remained in Martina Franca it was exclusively and unselfishly social. He gave his attention wholly to trudging over the neighboring hills with me, making access easy to every type of trullo, and citing and explaining their characteristics and variations.

He gave me points sufficient to tell nearly all that the reluctant authorities seem willing to admit of the trulli.

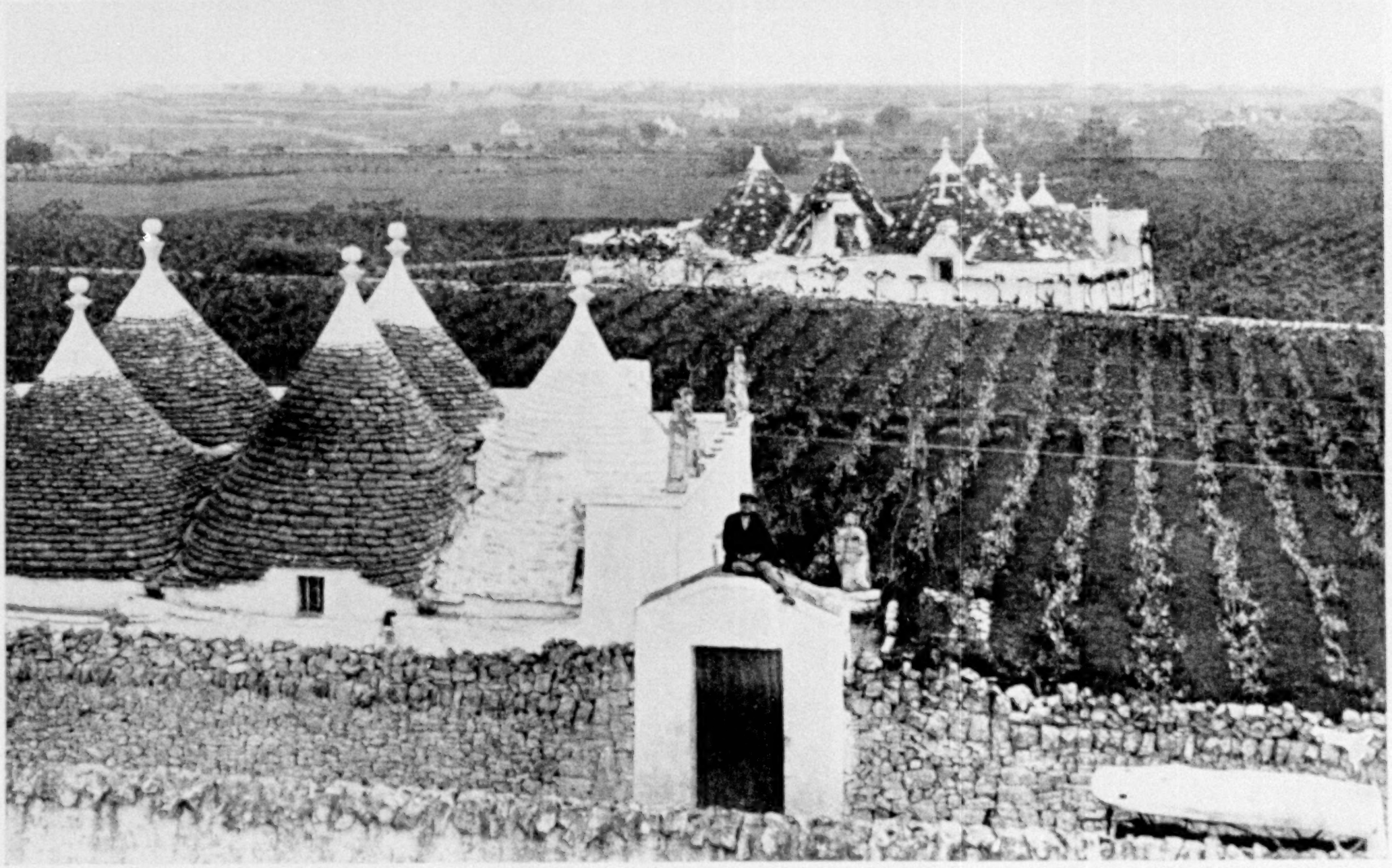
Michele Gervasio says that they are all modern, whereas Grassi himself says, "They appear to be extremely ancient and prehistoric." He also quotes De Giorgi as calling them "the last word in microlithic construction." Cosimo Bertacchi says, "The trullo is a survival of the remotest period." The trulli suggest to Gervasio the possibility of their descent from the specchie, prehistoric buildings of a megalithic character, remains of which have been found in many places in this "heel" of Italy.

These writers and several others bracket the trulli with the specchie of near-by Lecce, the talayots of the Balearic Islands,* and the nuraghi of Sardinia. As Gervasio remarks, however, the remains of the specchie permit no decision as to them. Between the trulli and the talayots and the nuraghi, except for dry construction, there is no common feature.

The nuraghi are enormous solitary towers, conical in their rise, but truncated, so that the cone never converges to its pointed peak, as in the trullo. Moreover, the nuraghe cone rises directly from the ground instead of, as in the case of the trullo, from a low perpendicular walled base. The nuraghe in its usual form is further distinguished from the trullo by the fact that, inside, it contains two rooms, one above the other, connected by a stairway in the wall.

As we were passing out of the city gate and the conical houses again came into view, I asked my learned cicerone the meaning of "trullo." He shrugged his

* See "The Balearics, Island Sisters of the Mediterranean," in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1928.



FARMHOUSES NEAR ALBEROBELLO ARE ALL TRULLI

With their peculiar roof decorations, these homes present a striking picture. On the outer wall of the building in the foreground and above the gate are concrete figures of saints. The owner is evidently a person of importance, for the poorer peasants do not go in for elaborate cornices and other decorations.

TRULLI ARE LAID UP FROM WITHIN LIKE CISTERNS

At a height of 6 or 7 feet the square base gives way to the conical top. The light patch on the left is sunlight from a large window. This picture was taken by setting the camera on the floor, with the lens pointed toward the ceiling. When this trullo is completed, the whole interior will be covered with plaster if the owner is well-to-do (see, also, illustration, page 248).

CROSSBEAMS MAKE LOFTS IN SOME TRULLI

When the householder needs an upstairs in his home, he sets a few timbers across the base of his cone ceiling. The rafters may support a floor for a second-story granary or serve, as in the present case, merely as convenient hanging places for cooking utensils and other things. This view from the floor shows the top of the door arch as a crescent at the upper right.

ALBEROBELLO HOUSEWIVES ATTENDING TO THEIR KNITTING

Nowhere else in Italy do people live closer to the soil than in the region of the trulli. Here houses, utensils, and clothing are homemade from materials supplied by the land.

shoulders and spread his hands in indecision.

"The origin of the word, as used to designate these Apulian cottages, has not been made clear," he explained. "There would appear, however, to be an affinity between it and *Trullus,* the name of the domed chamber in the imperial Byzantine palace in Constantinople. The Constantinople Council of 692 was held in the Trullus, and from it took its name, the Trullan Council, or Council in Trullo.

"The word means—well, it means just what we see there, as far as our eyes can see. It means the stone conical house, the domed house, unique to this neighborhood."

WALLS SEVEN FEET THICK

I was at first astonished by the apparently needless waste of material and effort that goes into the building of a trullo. Its side walls, though seldom so high as eight feet, vary in thickness from five to as much as seven feet. This might be interpreted as a survival of an age of defended

AUTOMOBILES NEVER INVADE THE MONUMENT ZONE

Raised stone crossings, built to enable the trulli dwellers in times of heavy rainfall to cross the streets dry-shod, make the going in this part of Alberobello exceedingly rough for wheeled traffic (see, also, illustration, page 253).

habitations, but in reality the explanation lies in the tiller's necessity to rid his land of rock, so that he may cultivate its rich, lime-laden soil.

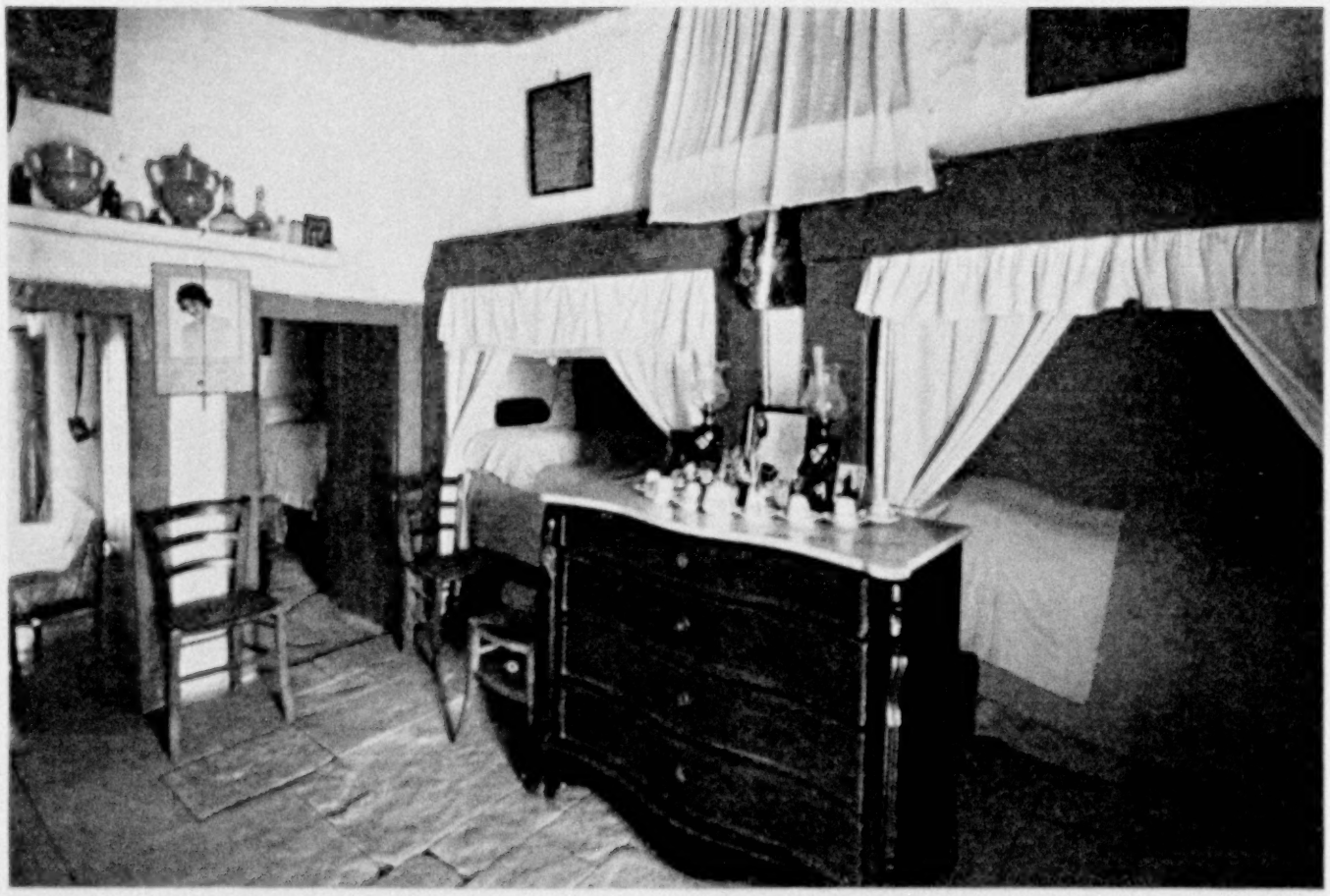
I discovered in the cool interior of the first trullo I entered that the thick walls serve to keep out the blistering heat of summer, and the hospitable *padrone* said that in winter they conserve every degree of precious heat given off by the handful of coals in the solitary fireplace.

Originally the walls were circular, and they are so even now in the humbler single-room cottages. The better and prevailing pattern, however, is a walled rectangle supporting the cone.

These country cottages are everywhere of one story only, which accented my surprise in often finding simple, narrow stone steps attached to one end of a wall, which have, however, no contact with the interior of the house. They lead only to the exterior margin about the base of the conical roof, for purposes unexplained and

ALBEROBELLO HAS LONG HAD ITS ROW HOUSES

Here is a style of architecture peculiarly adapted to the space-saving device of building homes with party walls. However, each of the trulli on this crowded street in the monument zone has its separate conical roof adorned with a conventional design (see text, page 251).



INTERIOR ARRANGEMENTS COMBINE UTILITY AND GOOD TASTE

Into one side of this room of a three-part trullo, two bed alcoves have been built by constructing deep arches in the thick wall and then closing up the recesses at the back with single tiers of masonry. Such sleeping quarters are found in nearly all of Italy's conical houses (see text, page 252). Stone slabs form the floors.

which I could not imagine, unless they were used as a convenience in going up to adjust any loose stone in the cone.

ONE DOOR, PRACTICALLY NO WINDOWS

Nowhere in trulliland did I see more than a single entrance door in the entire walled circumference of even the largest trullo.

Of windows, even under a group of cones indicating several rooms, there are few worthy of the name. Occasionally an opening appears in the wall, but it is rarely more than 15 inches square, and the wall about it is so thick that only a minimum of light and not any sunshine can enter.

When I looked through such a window I could believe that I was looking through a rectangular pipe, and the scrap of landscape in the distance suggested the reflection of a kodak finder.

WOMEN OF THE TRULLI REGION EXCEL AT WEAVING

The daughter winds the spindles while the mother operates the old-fashioned loom. Peasants of Alberobello could live comfortably if cut off from the rest of the world.

On entering a trullo I took off my hat, but not more for courtesy than from necessity, for the door is generally not more than the height of a south Italian's head and the lintel is horizontal. The variation on this, in the more pretentious trulli, is uniform. It opens for a deep round arch. The inner end of this arch is walled and a thin secondary wall is pierced by a small rectangular door (see page 251).

The stones are laid flat, without mortar or cement, and there is no suggestion of a keystone. How, then, is this conical dome sustained? I climbed the outer stairs and circled many a cone in a vain effort to solve the problem. Even when the shadowy interior of such a cone is not plastered, I could make out nothing from the inner edges of the stones.

Professor Grassi and the padrone of such a trullo enjoyed seeing me baffled. I discovered them exchanging winks. Well, what was the answer?

They led me to a trullo in course of construction on a neighboring hillside. The explanation, like the explanation of many other marvels, was simple. The contadino and his two sons chiseled each and every stone in keystone fashion. They laid them circlewise in an ascending and diminishing spiral. Every stone in the dome of a trullo is a keystone, for each one

TRULLO CONES CAP THE SPIRES OF SANT' ANTONIO

In erecting this new church, the architect worked out a plan by which the edifice combines the traditional architecture of the district with that of formal ecclesiastical buildings. With the parish priest (foreground) is the young mayor of Alberobello.

WINDOWS ARE FEW IN TRULLI-LAND

When the peasant builds his house, he constructs arches as means of ingress and egress and later sets into them his rectangular doors (see text, page 249). The square-cornered entrances shown here are somewhat rare. Because of the thickness of the walls, often 5 to 7 feet, the interiors are dark. Boys find the stone roofs of Alberobello easy to scale.

wedges the others. This geometrical construction makes it more solid than cement.

Another astonishing thing I found in this incomplete trullo is that the rough, heavy slates are usually laid two and often three stones to the width of a course, the courses circling and narrowing in diameter as they approach the top.

CRUDE DECORATIONS FOR THE EXTERIOR

The higher and more slender the cone, the more beautiful and graceful it is; but it is the squatter cones which especially excite wonder as to how these dry, unkeystoned structures hold themselves up.

The Apulian is fond of decorating the exterior of his trullo, but his resources seem few and his results are primitive. He generally finishes off the apex with a sort of button of cement. Occasionally this gives place to a sphere, or a cross, an acorn, a pine cone, or even a vase form, and I saw rare instances of such employment of the image of a saint or of a cement eagle with folded wings (see pages 230, 231, 244, and 248).

The only other method of decoration is to whitewash certain of the stone ends on the rise of the cone, and thus pick out designs, in rude patterns, visible for some distance across country. Most often the design displays the owner's or dweller's

A LIGHTNING ROD PROTECTS THIS TRULLO

One of the cones of Sant' Antonio Church (see illustration, page 250) here stands out in sharp contrast against a background of the newer part of Alberobello. A Gothic parish church looms in the distance.

own initials in letters three or four feet high; or a cross, frequently with strangely drooping arms; or a single letter M, a pious offering to Mary, the Madonna, sometimes with the lower ends of the perpendiculars of the letter extended downward and drawn together in curves, making of it the suggestion of a heart; and I saw two circles with a perpendicular line drawn through them, much like the outline of two apples on a spit.

Sometimes the dweller in a trullo will indulge himself so far as to outline a great cross or a two-arm amphora with his initials on either side of it; but among these simple people this is considered ornateness carried to the point of ostentation.

If the owner have a wall-top margin around the base of his cone, and if he be untidy enough to let dust accumulate there, Nature sometimes adds a note of decoration. The winds that catch up the rich, dry earth also catch up seed and pollen with it; and when, after many years, perhaps, the deposit becomes thick enough to sustain an ever-so-delicate root tendril, the spring rains and summer sun draw out delicate leaves and blossoms, and many a trullo's margin is feathered with slender blades of grass, and with the blue and red and yellow and purple blooms of wild flowers, producing a gay floral cornice (see Color Plate IV).

I found on entering a trullo, whether of one or more rooms, that the stone fireplace is directly opposite the door. Here the kettle is set steaming, the meals are cooked, and in cold weather the family huddles for the sake of any warming radiation in the little pit of coals.

If the farmer be poor, his bed is pitched in a stone alcove in the wall, and, as this is a poor country, the alcove beds prevail. In the houses of the well-to-do the beds, whether out in the room on their own frames or in alcoves on a stone support, all seemed broader than they were long. Generally they were piled high with feather tick and puffy comforters (see page 248).

The floors are limestone slates like the walls and cone, roughly laid in general,

STEPPING-STONE BRIDGES CROSS THE LOWER STREETS

Heavy rains sometimes make shallow rivers running through the Alberobello market, and the townfolk have constructed raised walks across the roads (see, also, page 247). Similar devices are found in Pompeii.

TRULLI SHOPS IN ALBEROBELLO

Though business buildings in the newer part of town may be of modern architecture, some of the smaller stores in the old section are housed in "stone beehives."

DOUBLE TRULLI ARE SELDOM SEEN

Buildings with separate cones for each room outnumber the type in the center by fifty to one. This double structure has two outside entrances, with no inner door connecting the chambers (see text, pages 234 and 258).

IN THE DISTRICT AROUND CISTERNINO ONE SEES NO BUILDINGS BUT TRULLI

The extent to which this style of architecture predominates in the rural districts is evident from this view. In the left background lies Cisternino. Like all towns in the trulli region except Alberobello, it has only flat roofs.

THERE IS LIVELY BARTER AMONG TRULLI FOLK ON MARKET DAY

Every Thursday the farmers from outlying districts bring their produce to the public square of Alberobello.

THRONGS JAM THE NARROW STREETS OF ALBEROBELLO ON FÊTE DAYS

The figures are borne out of the church in procession. In this part of the town the trulli occasionally rub walls with more elaborate buildings.

A TRULLO STABLE

Buildings on the peasant's homestead are all of the same construction, though naturally the living quarters are higher and somewhat more carefully put together than the barns and sheds.

and are covered with nothing more than an occasional straw mat or more rarely with a scrap of carpet.

In passing from one room to another, I was struck with the extraordinary thickness of the walls, giving every interior doorway the depth of a passage. This is because a trullo is in general built by the addition of room after room, one at a time, on the original unit, and the wall between rooms was at first an outside wall.

A man anticipating the addition of other rooms to his trullo constructs a closed archway on the side against which he later expects to build. When he adds another cone—that is to say, another room—he breaks down the filling of the arch; but I do not remember to have seen any doors swung in these deep interior doorways.

If a trullo have more than one door admitting from the outside, then any such additional outside door admits into a room which, though structurally attached to the general unit, is without access to it by a door through an inner wall. Such a room is usually devoted to live stock, tools, grain, or other storage.

Under the several domes of a trullo unit I felt in the presence of a primitive suggestion of the vaulted chambers which in Gothic architecture flowered with such beautiful lines and decorations. In the better houses only the walls and the high, pointed ceilings are plastered over and whitewashed.

EVERY CELLAR IS A DOUBLE WINE JAR

In every hut we entered we were offered wine and other refreshments with a simple but gracious hospitality. The head of the house, instead of going to a sideboard, would get down on his knees on the floor and displace a stone flag a generous foot square—the opening to a stone, cement-lined well or tank. A wall divided the tank into two chambers. In one he kept white wine and in the other red.

He would let down a hollow reed and by suction draw up the liquid into a carafe, from which he would serve it to us. It was a mild wine or I should not have survived the etiquette which demanded that I sample the hospitality of every trullo I visited.

From Martina Franca the way north

PLOWING IS POSSIBLE ONLY IN CLEARED FIELDS

Once free of rocks, however, the soil near Alberobello richly rewards the peasants' labor, for its high calcium content insures fertility. The ever-present limestone is really an asset, though it seems a nuisance.

was through a continuing countryside exclusively of scattered cones—grotesque, fantastic, and bizarre—until at Alberobello I found the single instance of trulli appearing in the agglomeration of an actual town. Here is a compact forest of stone cones. The streets are lined with them; every opening presents them in perspective; they huddle shoulder to shoulder, wall to wall, in all shapes and sizes and groupings.

When, at sight of this strangest of all European towns, I exclaimed: "Well, seeing this for the first time is an experience I can never have again!" my cicerone rebuked me, without intending, with the pleasant, philosophical rejoinder:

"But the memory of it is something no one can ever take from you."

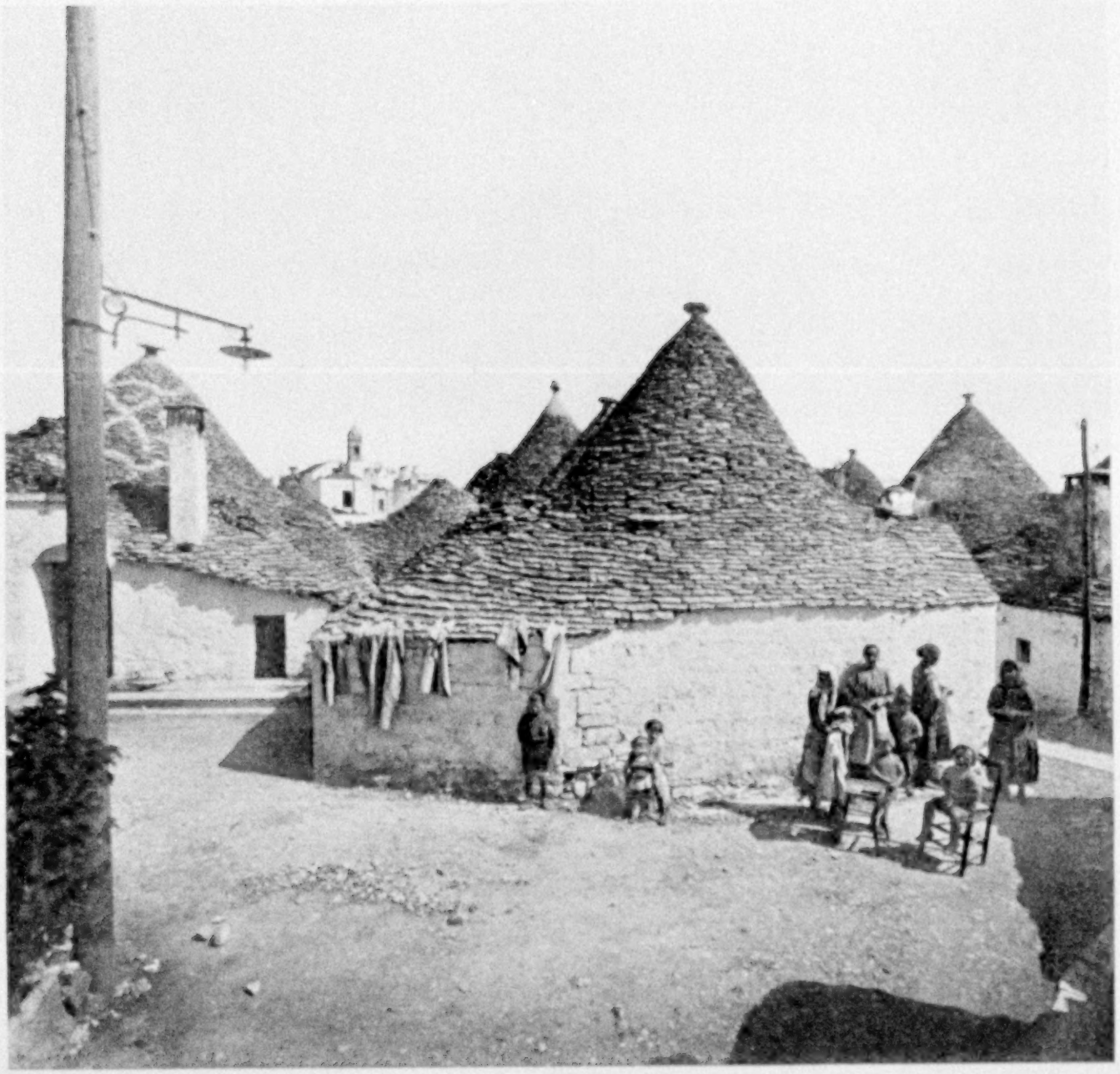
TWO-STORY TRULLI ARE FOUND IN TOWN

Alberobello presents variations of the trullo not seen elsewhere. Here, having come to town, the modest one-story cottage seems to have succumbed to the exigencies of a crowded life, and occasionally so far loses its homely countryside character as to take on a second story; but its original character clings to it in the thick walls and the conical roof.

Here, too, are examples of the change which, in the 17th century, in a few instances, the trulli, in exchange for a second story, gave to the town built with eaves. The roofs of such houses are here laid with the native flat stones, in dry courses, just as in the cones, and, as in them, kept in place by a nice adjustment.

From all the trulli of this town of trulli, where every size, and age, and shape, and decoration is represented, the Italian Government has picked and crowned the largest of them, the so-called *Trullo Sovrano*, to be a national monument, and thus to it extends its protection from decay, destruction, or any change whatever, in so far as it can control.

Yet the trulli seem out of place in town. They belong in the stony fields and on the plowed hillsides, from which they rise so naturally, and to the exclusion of any other type of building. There, though rough and crude, austere, and for the greater number unadorned, they are some-



PROGRESS REACHES THIS TRULLI VILLAGE IN THE FORM OF ELECTRIC STREET LIGHTING

how beautiful, as almost any object may be in its proper setting, from which it has risen in obedience to a natural law. This is their own land; here they belong.

It is in approaching the edge of the *Plaga dei Trulli*, beyond the little town of Putignano, the first reappearing flat-roofed farmhouses seem out of place, intruders and somehow ugly.

Coming down and out of the Murgian foothills here, a little nearer to the Adriatic, I thought the rocky emanations were less insistent in the soil. Just in proportion as the rocks became fewer and disappeared, so did the trulli thin out and disappear from the landscape. When Conversano was reached, there was scarcely a cone in sight, though the sea was, in sunlit glimpses where the hills dip low.

Travelers on the coast roads, motor or rail, between Bari and Brindisi may observe some detached single-cone trulli. They may be puzzled to see other small circular stone and cement structures consisting of from one to three or four shallow truncated cones superimposed one on the other, each cone of lesser diameter than the one below.

In these odd little buildings the fishermen merely store nets, or the farmers use them as tool houses or as temporary shelters in bad weather. As human habitations, the trulli are peculiar to the highlands a few miles inland, the district which they adorn in such bewildering numbers, to which they give their name, and which, to me, will always be unforgettable.

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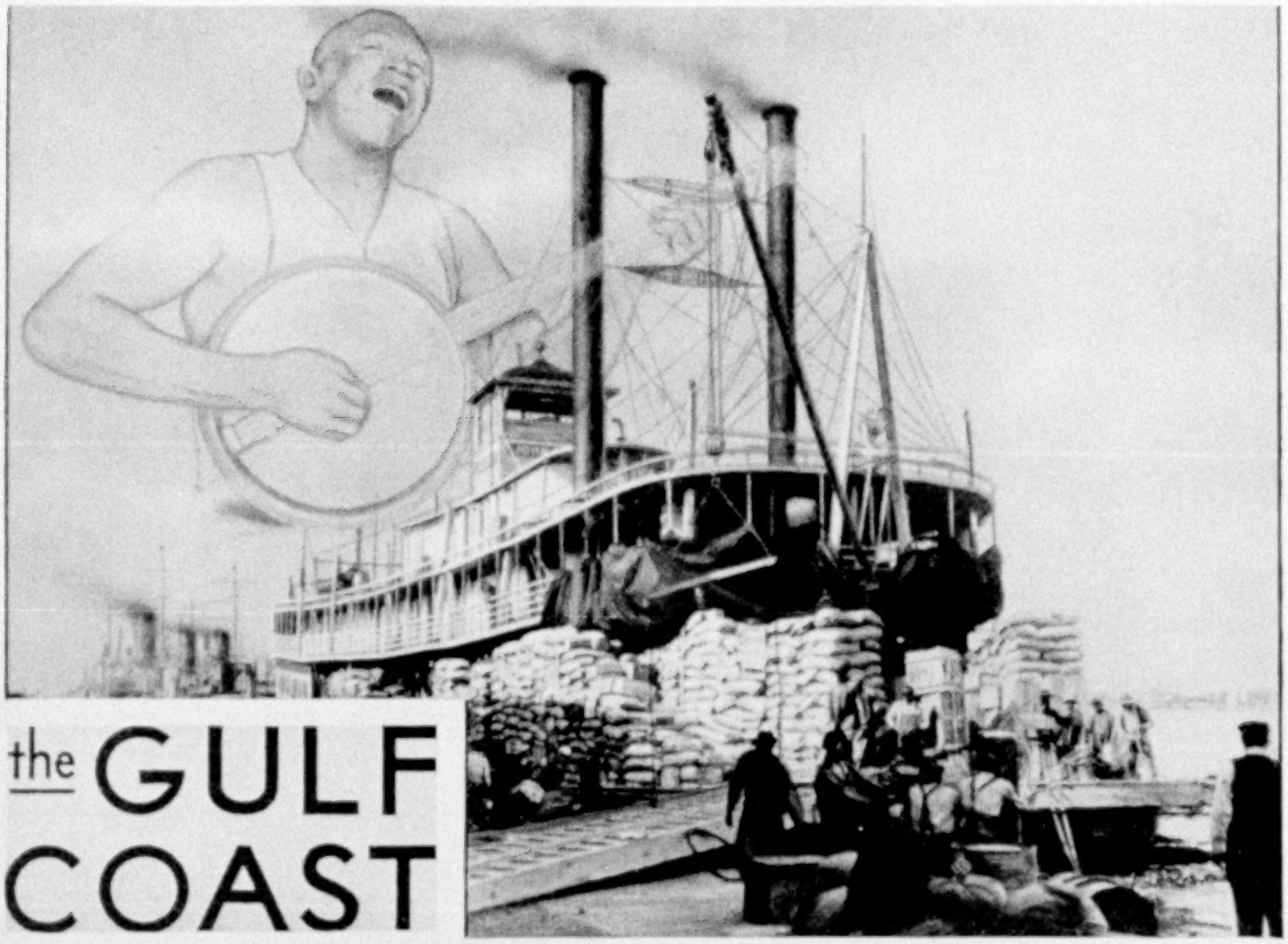

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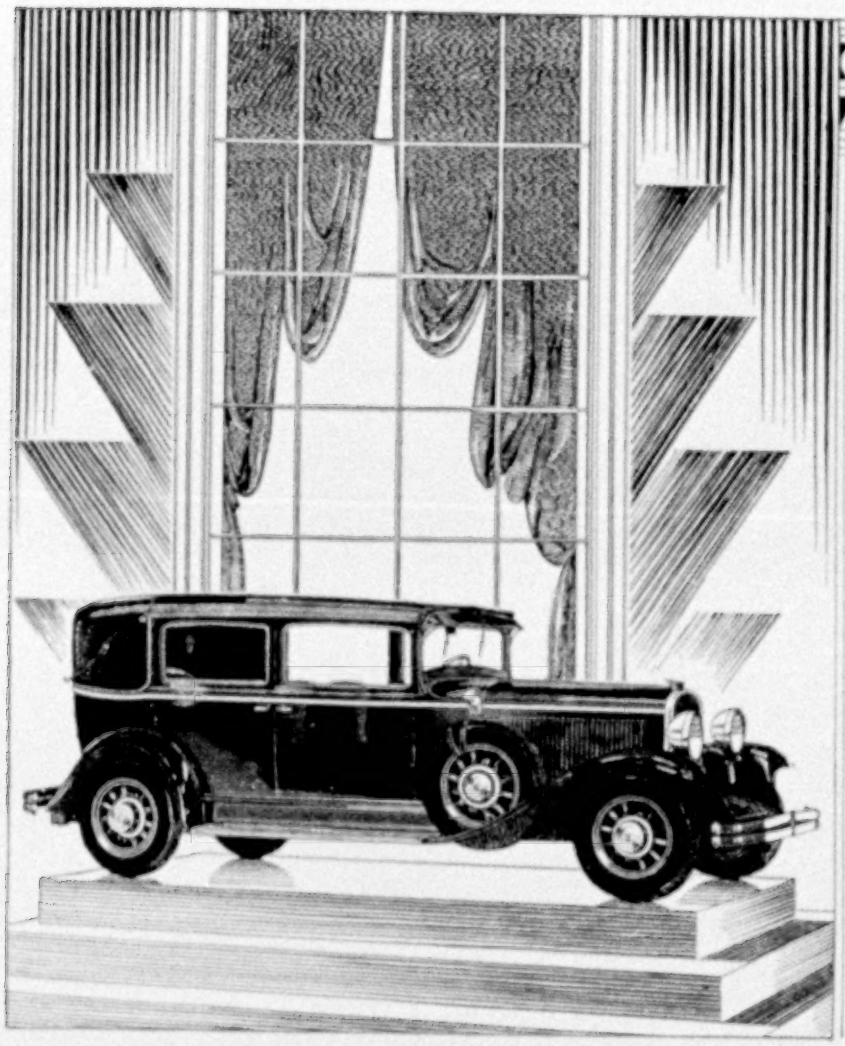

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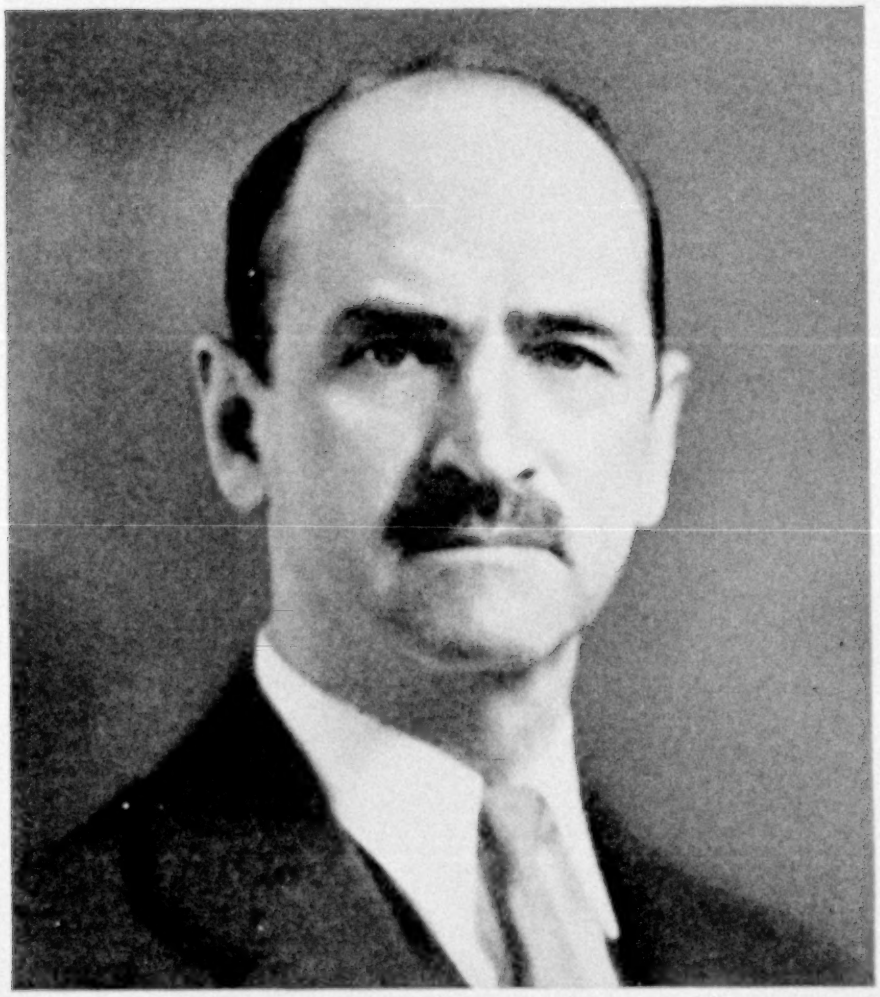
"The faster we go · the better must we sleep!"

says GLENN H. CURTISS



GLENN H. CURTISS, *pioneer of the air, has had a tremendous influence on the development of aviation. An expert mechanic himself, he built up the finest engineering staff in the country, and as a result, The Curtiss Company are outstanding builders of planes and engines for commercial and government uses. His early planes, built on aerodynamic principles now acknowledged as correct, were the forerunners of the planes of today.*

•

An interview with the Aviation Pioneer by Cornelius Vanderbilt, Jr.

"IN these days of great activity and fast travel, comfortable slumber is more important than ever before. We are living longer—living faster—living more—and we should sleep proportionately," believes one of America's foremost aeronauts.

Speed seems to be the very essence of Glenn H. Curtiss' soul.

For twenty-seven years his entire science of life has been wrapt in it.

It is the quality rather than the quantity of sleep which seems all-important to Mr. Curtiss. "We need comfortable slumber," he says. "Sleep and sleeping equipment should keep pace with these times of high speed, travel and crowded days."

Certainly to Mr. Curtiss, sleep is the battery that keeps him ever actively at his job.

Today he is as youthful in appearance as he was fifteen years ago. Tall, angular, nimble and wiry, with no knowledge of fear; a direct, frank personality. No wonder he has been associated with many of the largest aviation corporations in the land!

Verily, his advice of "proportionate sleep" in our modern program of life should be heeded.

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SIMMONS, largest makers of beds, springs and mattresses, have developed scientifically the sleep equipment for complete relaxation and healthful sleep. Simmons Beautyrest Mattress—hundreds of sensitive coils under thick layers of upholstery, damask covers—$39.50; Ace Box Spring, $42.50; Ace Open Coil Spring, $19.75; the new Deepsleep Mattress, another inner coil mattress at a popular price, $19.95; Slumber King Spring, $12.00; Deepsleep Box Spring, $27.50. The Simmons Company, New York, Chicago, Atlanta, San Francisco.

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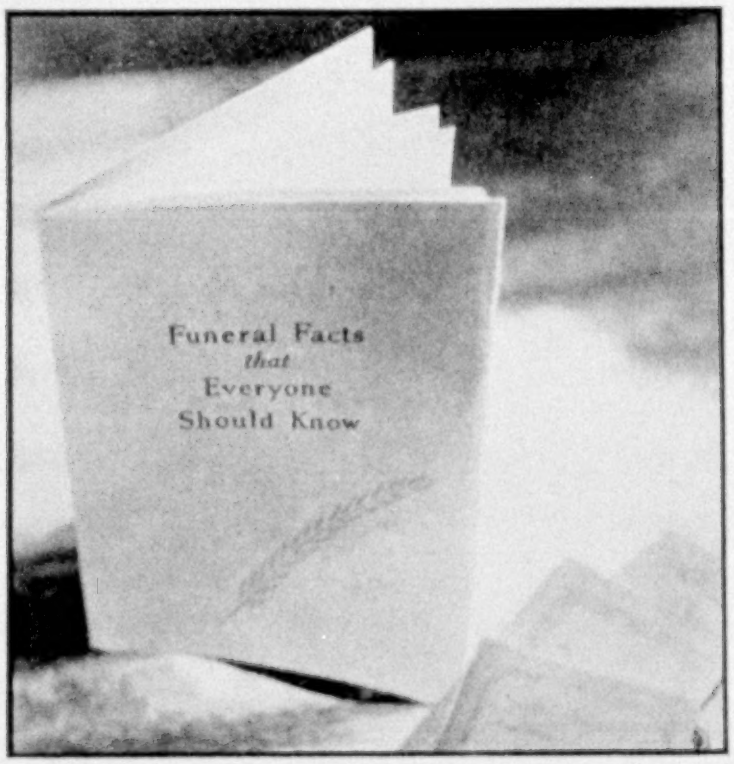

THERE is such a person in every family. The one to whom the others turn instinctively in every crisis.

But there is one emergency when even this "friend in need" is often at a loss to know just how to proceed. That is when death occurs.

Unfamiliar questions arise—questions which must be answered at once . . . what should be done first? . . . who shall the funeral director be? . . . where shall the funeral be held? . . . what sort of casket will be most suitable? . . . what should it cost? . . . what about newspaper notices, automobiles?

There is rarely much time to find out about these things. The obligation is a heavy one. Yet the man (or woman) responsible is expected to know just what to do—and do it perfectly.

From our long experience we can help—before the emergency arises. In a little book, "Funeral Facts," prepared with the aid and advice of leading funeral directors and health authorities, we have published the answers to those questions often so difficult to ask—and to answer.

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HAVE you noticed what you believe to be symptoms of decay?

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Germ-laden film fills every tiny crevice in enamel. It clings so tightly that you may brush until you harm the teeth and gums without dislodging it effectively. That is why all ordinary methods fail in combating film successfully.

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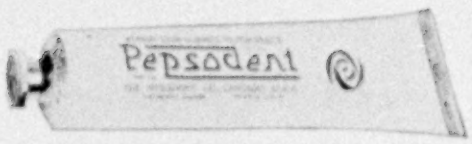
To reach and remove these germs, film must be combated. To remove film dental authorities developed the different acting tooth paste, Pepsodent.

First, Pepsodent curdles film, then light brushing easily removes it . . . safely, gently. No pumice, harmful grit or crude abrasive, but a fine, creamy paste commonly prescribed for soft teeth and tender gums.

When shall we send your supply?

You can tell that Pepsodent is different from all other ways the instant it touches your teeth. Can see the difference in results before your free tube is empty. Here is a way to lovelier teeth plus far greater protection from these serious diseases. Write to nearest address immediately for your supply to try.

Use Pepsodent twice a day. See your dentist at least twice a year.



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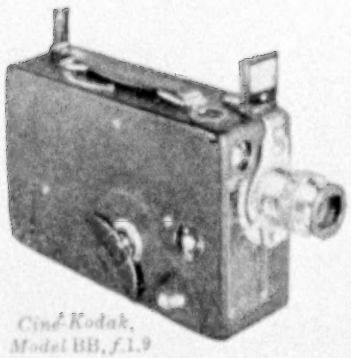

Ciné-Kodak, Model BB, *f*.1.9

A Movie Camera that Understands Amateurs

Anybody Who Can Press a Lever Can Operate It!

Even the Moderate Purse Can Afford It!

A Remarkably Simplified Home Movie Outfit, Developed by the People Who Made Still Photography so Easy that Picture-Taking Became a Game for Children

ITS simplicity is amazing. For it is made *for amateurs*, by people who understand the requirements of amateurs. A home movie camera made for those who know but little about picture-taking.

Look through a finder and press a lever; and you are taking movies... in black-and-white or in *full color*. You can operate it, even if you have never had a movie camera in your hands before—as easily as taking a snapshot with your child's Brownie!

And... you can afford it, even if your income permits only the minor nice things of modern life.

Don't deny yourself the great thrill of seeing the ones you love most in the ways you love most to see them, never to be lost, never to be forgot.

Developed by the Men Who Simplified Amateur Picture-Taking

Unbiased by the precedents and prejudices of professional cinema camera design, the men who made still photography so easy have now made home movie-making equally simple for you.

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That's the point to remember about the Ciné-Kodak. For you want the *simplest* movie camera you can get.

With Ciné-Kodak Safety Film, regular or panchromatic, it takes black-and-white pictures. By using Kodacolor Film and the Kodacolor Filter, Ciné-Kodak B or BB *f*.1.9 takes beautiful pictures in full, natural color—every color that the eye can see is recorded for your home movie screen.

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You simply press a lever to take home movies with this camera.

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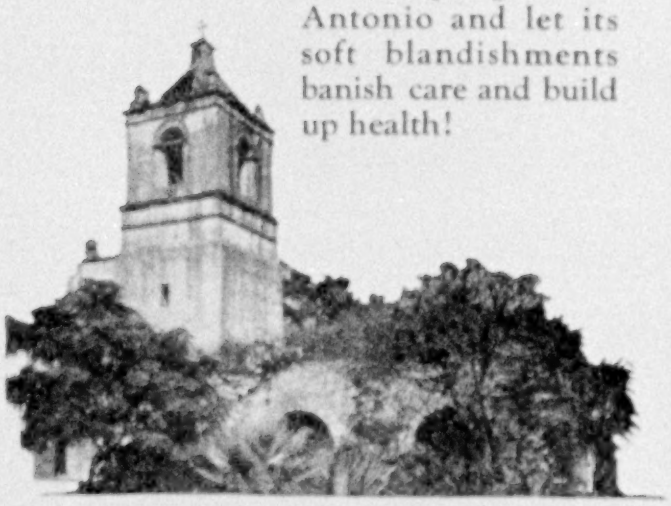
Come meet the Spring in San Antonio and let its soft blandishments banish care and build up health!



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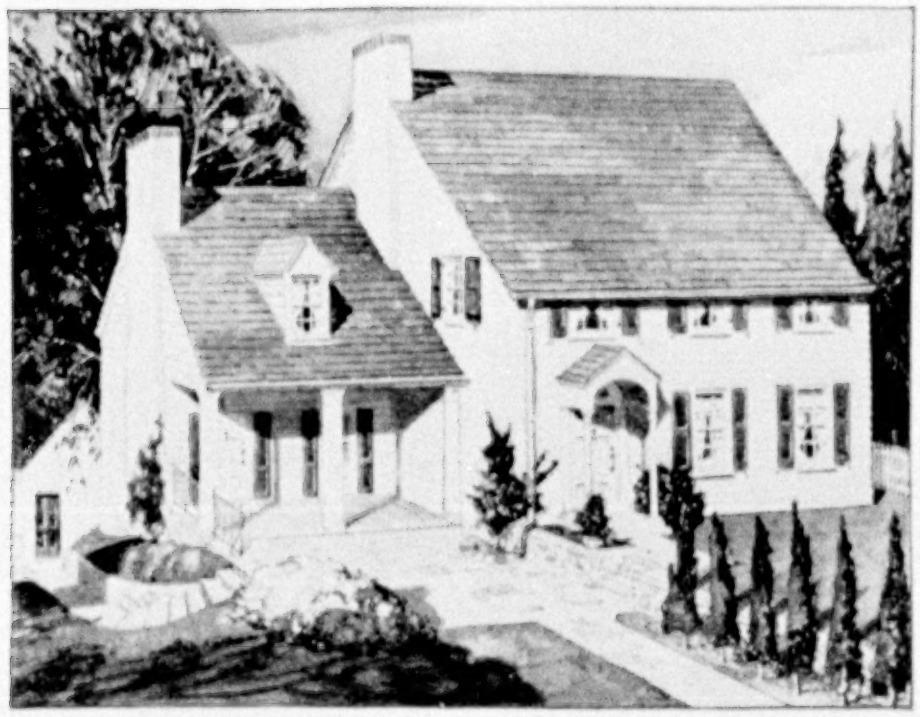

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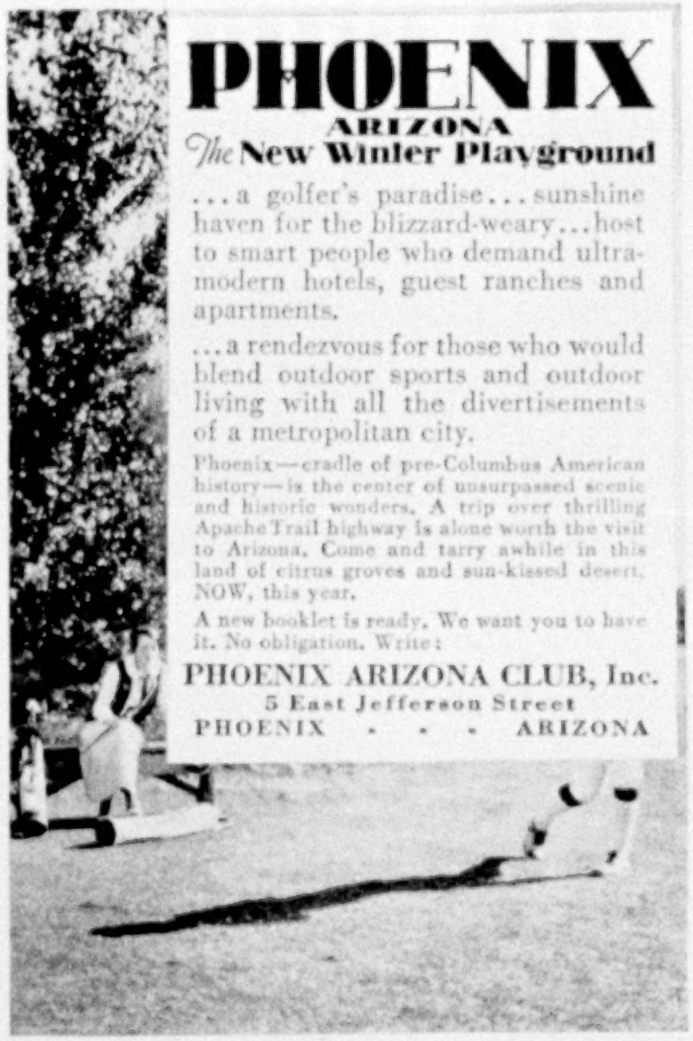

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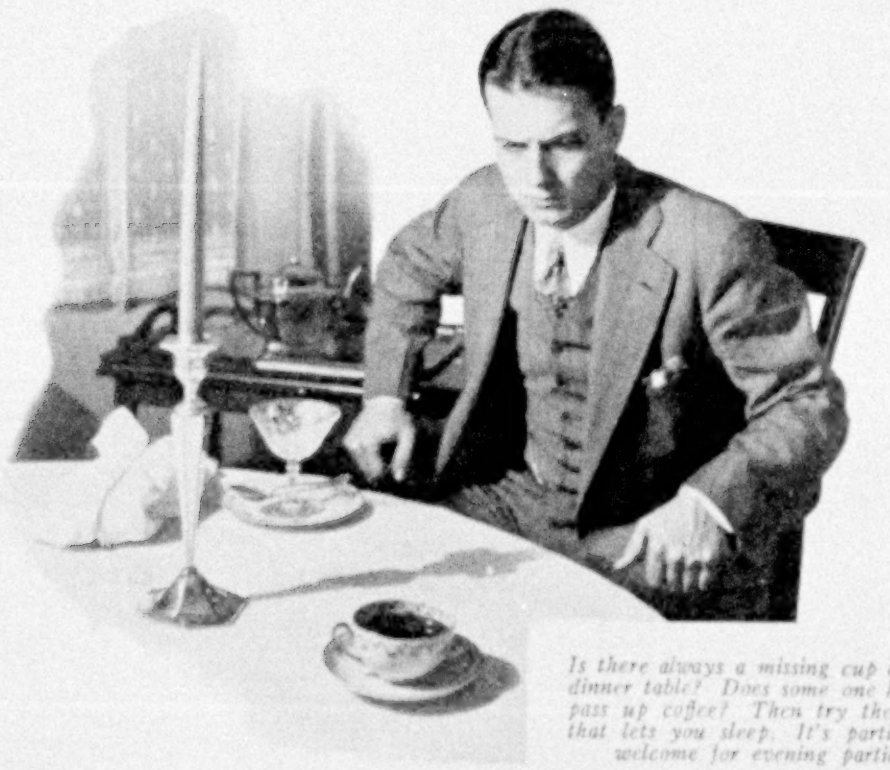
but fears to drink it at night?



Is there always a missing cup at your dinner table? Does some one have to pass up coffee? Then try the coffee that lets you sleep. It's particularly welcome for evening parties.

COFFEE is America's national beverage. Its cheer makes every meal more enjoyable.

Yet at dinner—chief of family gatherings, where coffee adds so much to pleasure—thousands never drink it for fear that it will keep them awake. And many who are fond of its flavor do not drink it at all.

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Kaffee Hag was the first caffeine-free coffee. Now Kellogg, after years of experiment, has wonderfully improved the blend. Today there is no finer coffee to be found. Ask your dealer for Kellogg's Kaffee Hag *in its new vacuum can.*

We'll send you a sample . . . For 10c, to cover postage, etc., we will mail you a 10-cup sample of this great caffeine-free coffee. Try it *at night*. Flavor! Aroma! Cheer! And restful sleep!

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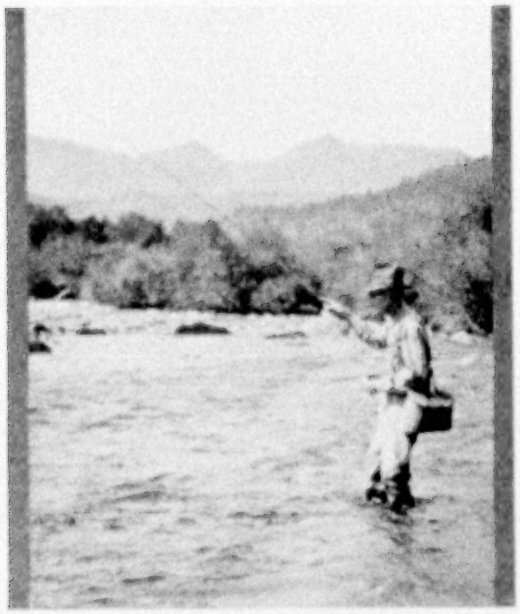

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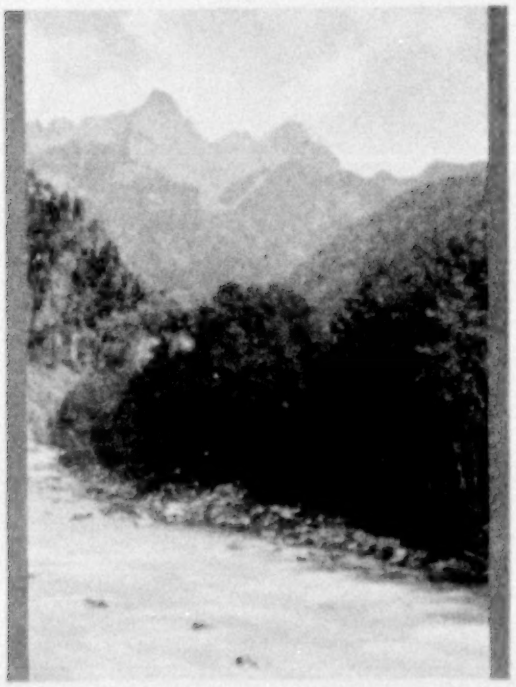

UPPER LEFT: Typical of Colorado's 7,000 Miles of Trout Streams.

UPPER RIGHT: Crow Hill—an example of mountain highway construction.

LOWER LEFT: Pigeon Peak (14,091 Feet) in the Needle Mountains.

LOWER RIGHT: Colorado Cauliflower Field.

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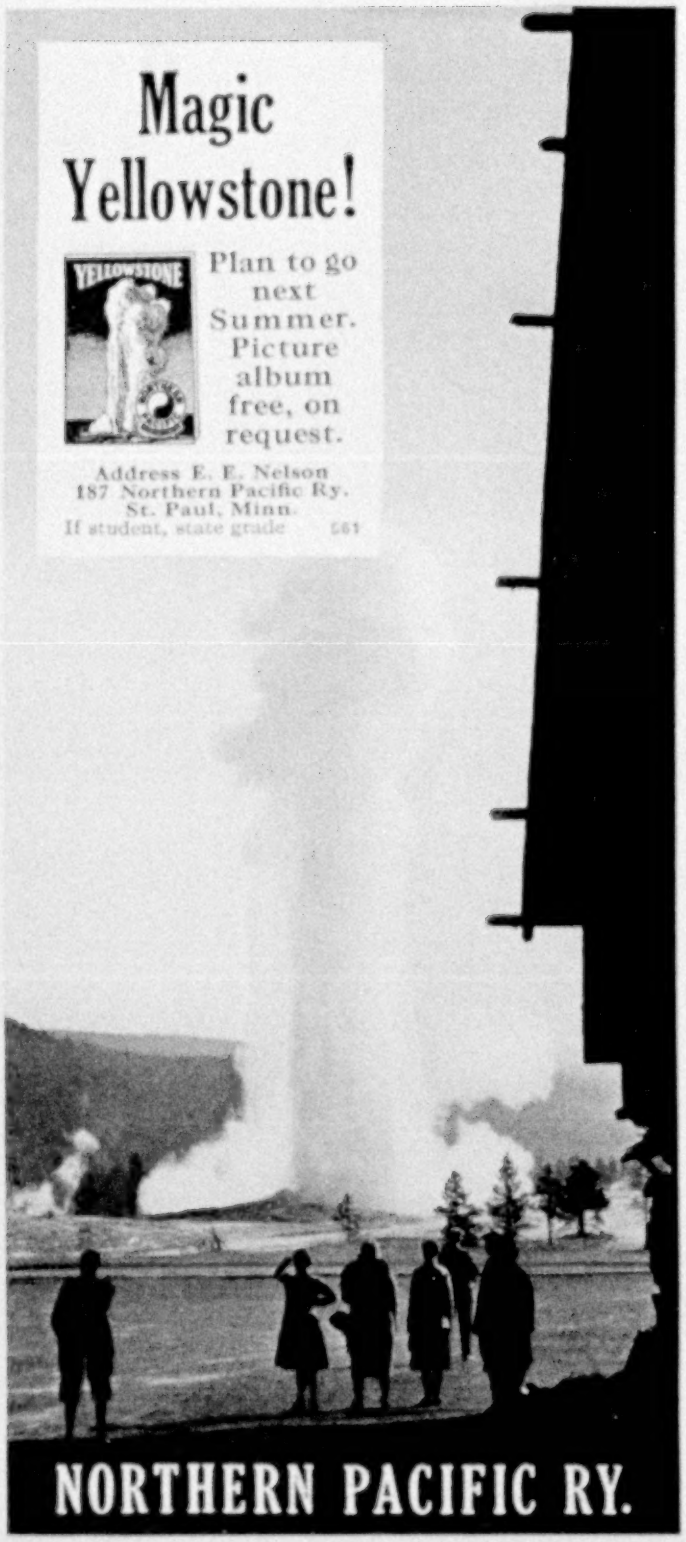

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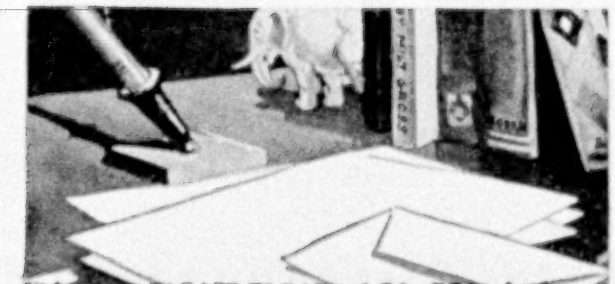

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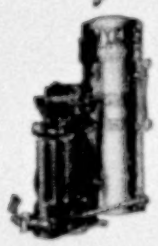

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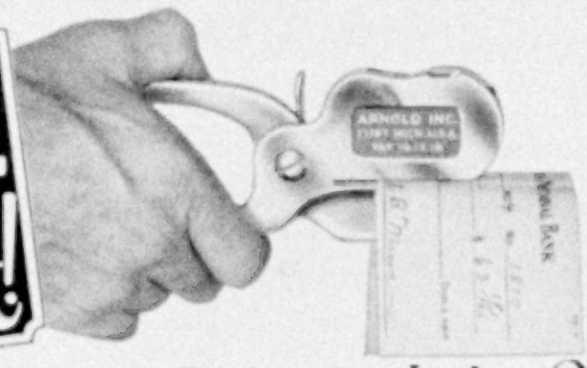

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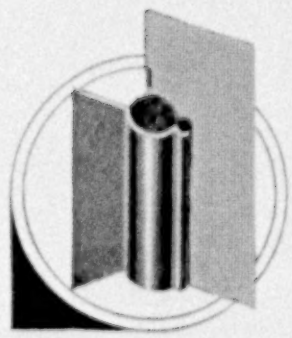

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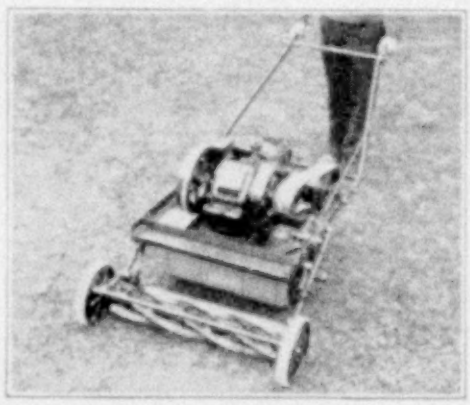

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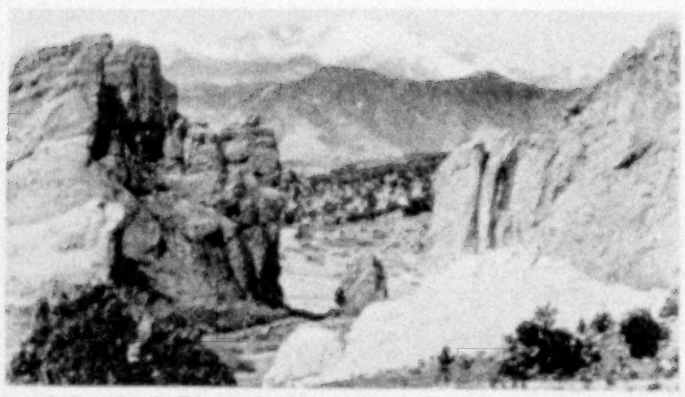

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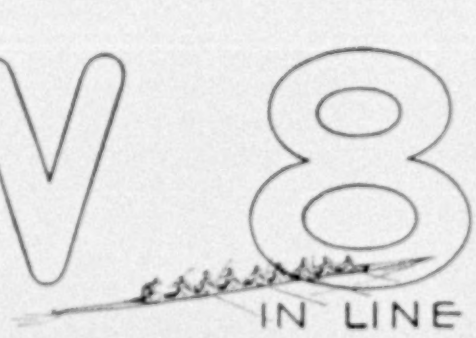

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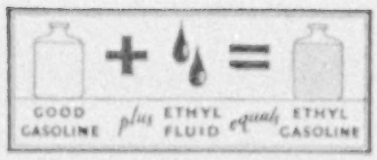

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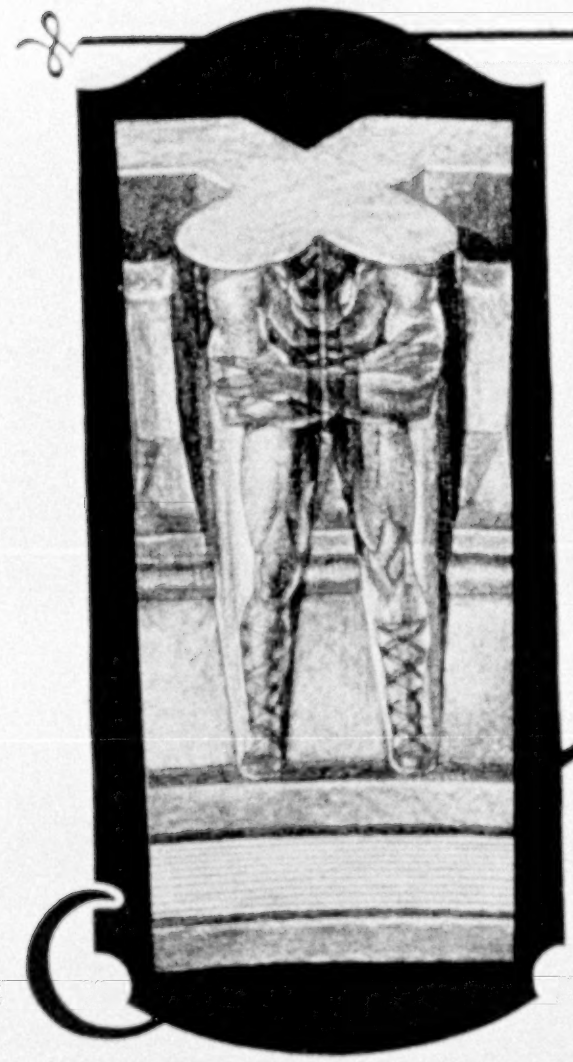

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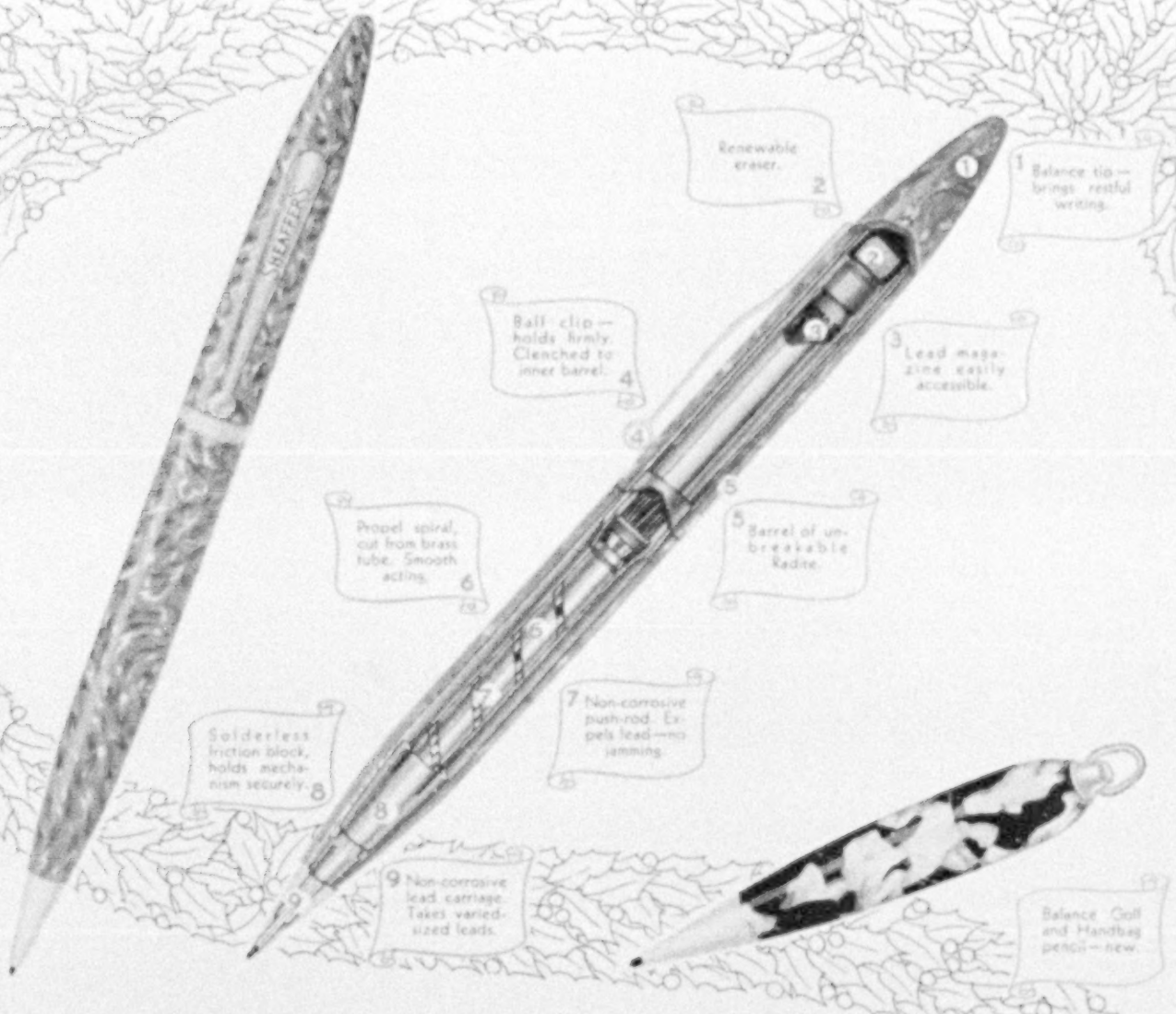
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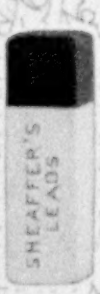
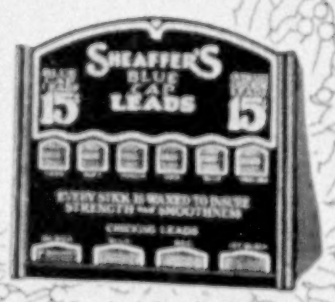


Uniform Blue Cap leads, 15c



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